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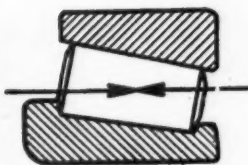
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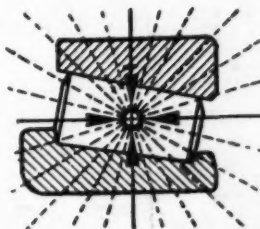


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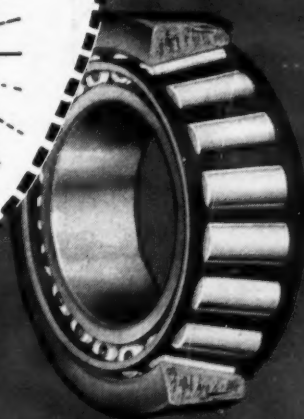
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AUTOMOTIVE INDUSTRIES

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NEW YORK—THURSDAY, OCTOBER 18, 1923

No. 16

Where Is the Truck Industry Going?

Frank analysis of facts may aid in finding answer. Twenty companies made 95 per cent of all commercial vehicles of 1922. Same 20 made 98.9 per cent in first half of 1923. Two roads to salvation open for weaker concerns in the field.

By James Dalton

THE motor truck industry is on the way, but where is it going?

Fundamental conditions haven't changed, although business has been good for the last 18 months. Sales last year were 66 per cent better than in 1921 and another gain of 60 per cent over 1922 is promised this year.

Demand will expand year by year and no one can measure what the world's commercial vehicle market will be ten years hence. Then as now, however, the major part of the business will be concentrated in the hands of a comparatively few companies.

What is to become of the smaller companies?

There is no universal panacea. What may be good medicine for one may be bad medicine for another. Nevertheless, a good diagnostician can find something which will relieve the malnutrition from which they are suffering.

One thing is certain. The scores of companies with

an output of only 200 or 300 a year or less, and there are only about 30 in the field which makes as many as 400 annually, cannot hope to endure if they continue to operate along conventional lines.

By "conventional lines" is meant an attempt to get national distribution for trucks of the usual type, built in all capacities. Competition with the larger companies, with their lower production costs and greater merchandising efficiency, is ruinous.

The outlook is not in any sense hopeless, however. Imagination, backed by common sense and sound business ability, would pull many of these companies out of the hole.

Generally speaking, two courses are open to them:

1. Intensive cultivation of a local or circumscribed market for their products.
2. Development of a specialized type of vehicle, outside the "delivery wagon" field, which can be sold to some particular trade or industry.

APPROXIMATELY 100 truck companies are seeking national or large scale distribution.

Twenty of these companies made 196,000 or 98.9 per cent of the 198,000 trucks turned out in the first half of 1923.

It is self-evident that the others must adopt heroic measures if they are to continue in business.

This survey of cold facts points out two roads to salvation.

TRUCK PRODUCTION IN 1922-252,000

FORD ALONE 140,000	TWENTY LEADING COMPANIES INCLUDING FORD 238,000	243,600	ALL OTHERS 8,400
FIRST 30 COMPANIES INCLUDING FORD			

TRUCK PRODUCTION - FIRST HALF OF 1923-198,000

FORD ALONE 120,000	TWENTY LEADING COMPANIES INCLUDING FORD 196,000	ALL OTHERS 2,000
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The small companies which are continuing the expensive attempt to find a *national* market for products which differ only in detail from the products of all other makers, might find it profitable to study production figures. They would learn that:

- Twenty companies made 238,000, or 95 per cent of all the trucks turned out in 1922.
- Only these twenty companies had an individual production of 1000 or more.
- Only thirteen companies had a production in excess of 2000.
- Only ten companies had a production in excess of 3000.
- Only eight companies had a production in excess of 4000.
- Only five companies had a production in excess of 9000.
- Ford alone had a production of 140,000, or 55 per cent of the total.
- Seven companies in the first twenty, whose lines include no vehicles with a capacity in excess of 1½ tons, made a total of 55,000.
- Ford production, plus the output of these seven companies exclusively in the "delivery wagon" field, was more than 77 per cent of the total.
- Twelve remaining companies in the leading twenty, all of which make a complete line of trucks, turned out a total of 42,700, but four of these twelve had a combined total of 28,700, or 66 per cent.

National Distributors

At the close of 1922 there were 146 producers in the truck field with real or theoretical *national* distribution.

Total output of all companies for the year was 252,668. Deducting the production of 238,000 by the twenty concerns which made 1000 or more there was left less than 15,000 for the remaining 126 companies together with something like sixty others which were doing a purely local business.

This does not tell the whole story, however, for there were ten companies with an output of more than 400 and less than 1000 which made a total of 5600, leaving only 8400 for all the rest.

THAT MEANS A PRODUCTION OF 8400 TO BE DIVIDED AMONG AT LEAST 175 COMPANIES TURNING OUT TRUCKS!

There were not to exceed 50 companies in the whole field which turned out more than 100 trucks each in the year.

It may be contended that 1922 is ancient history and that material changes are being brought by 1923 which will give an aggregate output of something like 400,000, but figures for the first half show history repeating itself with the old story.

Ford output for the six months was 120,000, or only 20,000 less than for all of the preceding year. This was 60 per cent of the total 198,000 turned out by all companies in the first half. The other 19 companies which were included in the first 20 in 1922 made 76,000 in that period. Added to the Ford output, this gives a total of 196,000 out of the grand total of 198,000, 98.9 per cent, leaving approximately 2000 for the rest of the companies in the field.

Economic laws have begun to exert their influence, however, and there were only 101 companies claiming national distribution at the beginning of July as compared with 146 six months earlier.

This cold-blooded analysis is rather startling. Unless there is a sharp change of front it is not difficult to see what must inevitably happen to many of the small concerns which are battling so doggedly for a tiny fraction of the total business. Their courage is commendable, but their strategy is forlorn. The old adage that "he who fights and runs away will live to fight another day," is not especially inspiring, but it can be contemplated with profit by a lot of truck companies.

Not all of us can be Jack the Giant Killers. If we expect to fight giants we must study strategy. We may have to kick them on the shins or we may have to practice jiu jitsu, but either expedient is better than letting them shake our teeth out while we squirm helplessly.

There has been altogether too much follow your leader in the truck business. One company makes a success of a light delivery wagon. Immediately nearly all other companies start turning out delivery wagons with mighty few distinctive features. One company develops a bus for which there is a good demand and immediately other companies follow suit. And so on with every new idea.

Individuality and originality are what win success in business. It always is possible to put across a merchandisable idea. When a competitor develops some product which brings him profits it is vastly more profitable for you to work out some special product of your own rather than imitate his.

There seems to be a dearth of originality in the truck field. New ideas usually spring from the big producers, although there are notable exceptions which prove that they are not impossible for the small company.

Profit producing ideas can't be picked off bushes like

berries. They must be tried, tested and submitted to acid tests. Not all those which look good at first glance will bear searching analysis. Evolving them usually is a long and laborious process and something must be done to keep the wolf from the door while they are being worked out.

Unhappily, there are many companies which can't rock along indefinitely waiting for the idea laboratory to function. They need not despair, however, for there is one thing they can do.

That one thing is to abandon costly and hopeless efforts to obtain national distribution of their products in bitter competition with bigger companies which have dollars to spend where they have pennies. Armies frequently are compelled to shorten their battle lines and that is exactly what these truck companies must do if they are to ward off defeat.

With their limited resources they can't stand the expense of trying to sell all over the country. In the first place, they can't find strong dealers who will push a line for which there is a very limited demand. In the second place they can't give adequate service and unless their products are satisfactorily serviced they will get no repeat orders.

Outlining Territories

The first thing for them to do is to determine how large a chunk of territory they can cover more efficiently and less expensively than their strongest competitors. When that point has been decided they must merchandise in that territory more aggressively and effectively than any one else. If they seek only a purely local market, the selling can be done direct from the factory, saving dealer discounts and many other items of expense. If a larger market is sought, they must have a few dealers, but they should be high power, sure fire men who will deliver the goods.

It probably will be possible to sell in this limited territory as many trucks as have previously been sold in the entire country and at so much lower costs that a loss can be converted into a profit. While it is impossible to compete on a NATIONAL basis with the big fellows, it can be done in a circumscribed area both in respect to selling costs and trade in allowances.

But, and this is equally important, service can be controlled from the factory. It can and must be made better than that given by competitors who do sell on a national scale and who are dependent, of necessity, upon dealers in many places. The small factory will be in a position to give its patrons superlative service in the limited territory it covers and that will bring the repeat orders, which mean profits and permanence.

Careful Work Needed

Obviously, this procedure will not be as simple as it sounds. It will require a complete reorganization of factory methods and operations and it must be worked out with scrupulous care if it is to succeed. No detailed plan can be laid down which will fit specific cases. With the goal in mind, each company must work out its own salvation. It will require hard and straight thinking, but that is what factory executives are paid salaries for doing. Little difficulty would be found in working out a definite theoretical program, but it would not fit in all cases. The big point is that it can be and has been done.

For companies which have been operating or attempting to operate on a national scale it may be somewhat humiliating to curtail operations, but humiliation is vastly better than bankruptcy unless some question of honor is involved.

After a company has definitely determined the territory it proposes to cultivate intensively it can take up the question of specializing on some vehicle peculiarly adapted to a particular industry or trade. The chances are that this will be found in the body rather than in the chassis because there are few marked differences in the conventional chassis. If it is in the body that will bring up a new complication because exceedingly few truck makers produce their own bodies. This will make it necessary to find a satisfactory source of supply either inside or outside the plant. Difficulty probably would be encountered in obtaining protection on design, but imitators seldom are as successful as originators.

When a company seeks a specialized market, the first step, naturally, is to find a promising outlet. When that is done and the best vehicle possible for that market is designed, sales should be made direct from the factory, again eliminating dealers' commissions and other merchandising costs. This will require intensive salesmanship and the territory nearest the factory should be cultivated first with a gradual expansion of the market. If a company is to succeed with a specialized product, provision must be made for prompt and satisfactory service. There are numerous ways in which this can be done without the maintenance of exclusive dealers. Here, again, each company must work out its own plans.

Practically all makes of trucks are good vehicles. It must be confessed, however, that they're much alike. The industry has suffered from too much mass thinking, too much imitation and not enough originality. The company with little money and a new idea is likely to go farther than the one with more capital and a standardized product.

Chances for Success Good

Opportunities for success are just as good in the automotive industry today as they ever have been since the pioneering days. The major portion of the business in both passenger car and commercial vehicle field has been concentrated in the hands of comparatively few companies for a long time and it probably always will be. That doesn't doom a small company to failure, however. Examples of companies which are carving out success in both fields because they have ideas and originality are not hard to find. All those who know the industry are familiar with them.

No royal road to salvation is to be found in this industry any more than in any other industry. Each company must be the master of its own fate. The first step must be to look the facts squarely in the face. Analysis should show whether success or failure lies ahead unless present policies are changed. Any company making only 200 or 300 trucks a year and still seeking NATIONAL distribution should know that it cannot succeed on that basis. It might succeed, however, if it sold the same number in a sharply circumscribed territory.

Nothing is to be gained by going on the theory that all the other companies in the same boat will fail, but that you will survive and grow and prosper by some miracle. Unless you have individuality, originality and ideas there is no reason whatever for assuming that Providence will make an exception in your case.

What the truck industry needs more than anything else, except for the leaders, is a great deal of self examination and analysis plus large injections of originality and independent thought. Not all companies can be big or even medium sized, but most of them can be prosperous if they set about seeking prosperity on a common sense basis before it is too late.

German Show Is Largest Ever Held Despite Economic Troubles

Large number of new small cars feature exhibition.

Eighty makers show 130 different models.

Four cars have aluminum engines

By Benno R. Dierfeld

THE Berlin Show was held under considerable difficulties this year, due to the extremely unsettled social and political situation in Germany at the present time. Nevertheless, more cars were exhibited than at any previous show and a great many new designs were on view.

It is interesting to note that the cost of mailing this report from Berlin to New York was 30,000,000 marks.

NEVER has an automobile show been held under such unfavorable conditions as the present Berlin show. On account of the French occupation of the Ruhr District, the most important industrial section of Germany, economic conditions in the remainder of the country have become so difficult and confused that grave political consequences may eventuate any moment. The present dangerous situation is reflected by the fact that one day before the opening of the show martial law was proclaimed throughout Germany, the Government obviously fearing a revolution, either by the extreme reactionaries or by the communists, followed by civil war.

Despite this unfavorable situation the show was duly opened, and it is the biggest show ever held in Germany. In the large show hall on Kaiserdamm, which was especially erected for automobile show purposes in 1914, are exhibited only passenger cars and motorcycles, a separate truck show being held in the Sport-Palast, about four miles from the Kaiserdamm hall. Visitors to the passenger car show have to take a 30-min. ride before reaching the truck show. A separate hall in the Kaiserdamm is devoted to an exhibition of machine tools suited for use in the automotive industry.

Limited to German Cars

The show is of national scope only, and 130 passenger car models are being exhibited by 80 makers. Only a few German manufacturers are absent, some, like Mercedes, on account of the economic situation, and others, like Opel and Fadag, on account of the French occupation of the Ruhr District. Seventeen new passenger car manufacturing firms were established in 1923, most of them turning out small cars. Small models, with from 1 to 1.3 litres (60-80 cu. in.) piston displacement, are in the majority; then follow engines of 2 litres (122 cu. in.) and of 2.5 to 3 litres (152 to 183 cu. in.). Four-cylinder engines are favored and form three-fourths of the whole number. Almost all engines have block cast cylinders and more than one-fourth of all engines have their valves in the cylinder head, operated by a completely inclosed overhead camshaft. Side rods for operating the overhead valves are almost unknown in Ger-

many, because buyers prefer engines of very smooth exterior.

Small Cars Are Interesting

There are some interesting small cars at the show, among them the 20-hp. Baer, with water-cooled, two-cylinder, two-cycle engine of the differential piston type, and shaft drive, and the Grade, with an air-cooled, two-cylinder, two-stroke, three-port engine with $2\frac{3}{4}$ by $4\frac{1}{4}$ -in. cylinders, which develops 16 hp. at 1800 r.p.m. This latter car has a simple disk type friction transmission and chain drive to one rear wheel only, thus obviating the need for a differential. Frame and body are combined and are made of pressed steel. The weight of the empty two-seater with body is 880 lb., and the selling price in Germany is \$490 without lighting system and tires.

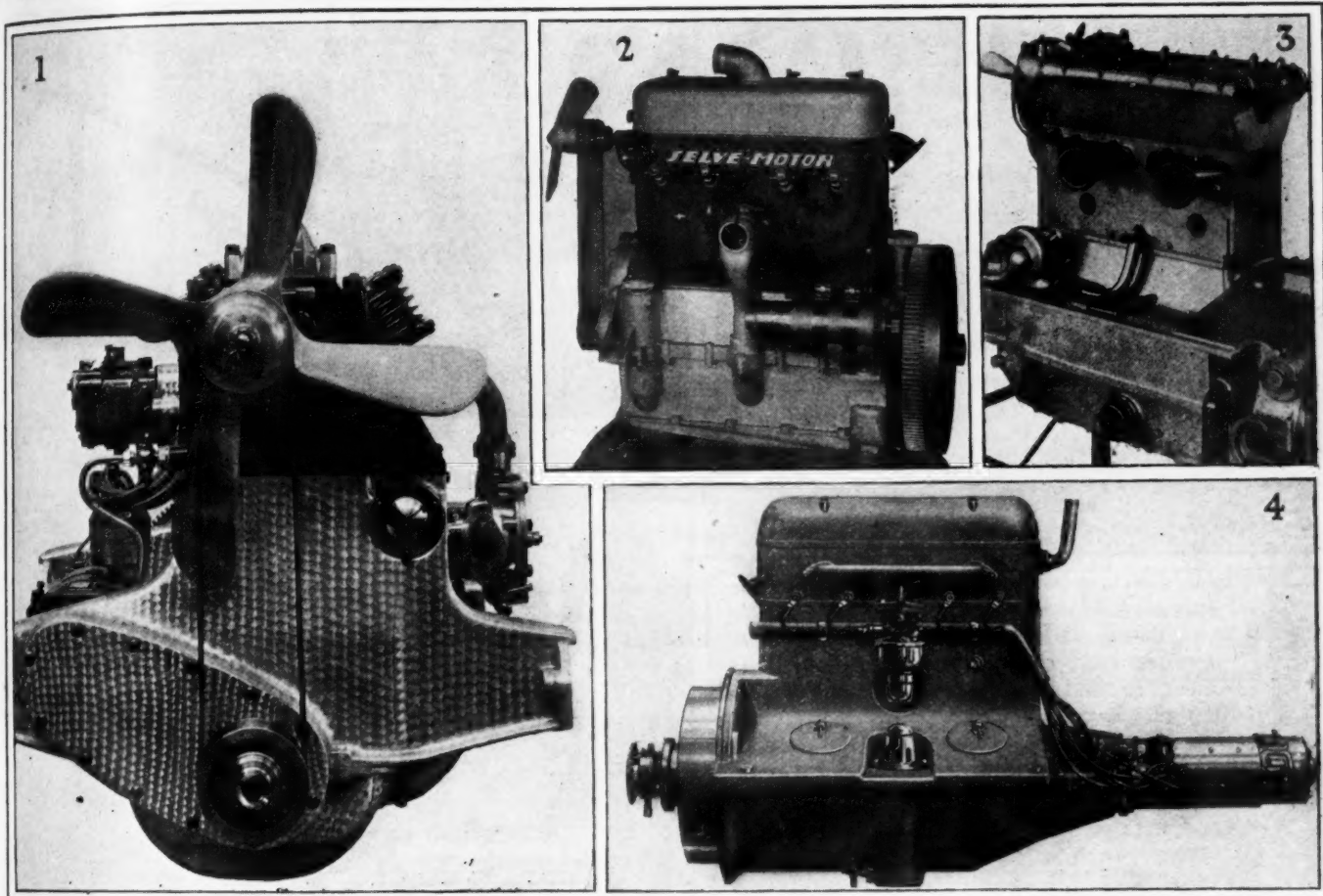
The Turbo light car differs entirely from all other types; it has an air-cooled rotating engine with five radial $2\frac{13}{16}$ by $2\frac{3}{4}$ -in. cylinders that develop 25 hp. at 2000 r.p.m. The engine drives through a disk clutch, a three-speed gear and a universal shaft to the rear axle, which latter incorporates a differential gear and two transverse cardan shafts. Coil springs are used, and the light frame is of an open girder type, made of sheet steel. The weight of the two-seater with open body is 1430 lb.

The Peter & Moritz has a two-cylinder opposed L-head engine of $3\frac{5}{16}$ by $4\frac{5}{8}$ in., with thermo-siphon circulation of the cooling water. It develops 20 hp. at 2200 r.p.m. The engine drives through a disk clutch, a two-speed gear and a propeller shaft containing one fabric disk joint. The final drive is by overhead worm. The rear axle has no differential, the track being only 44 in. Superimposed quarter-elliptic springs are used in front, cantilever springs in the rear. The weight of the two-seater, ready for service, is 1150 lb.

Pluto

A good example of a low-priced small car engine is the 20-hp. Pluto, built by the Ehrhardt firm, former munitions makers. The four L-head cylinders, of $2\frac{1}{4}$ -

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1—Front view of Dux six-cylinder engine. 2—Selve four-cylinder engine with passage through crankcase for preheating carbureter air. 3—Simson four-cylinder engine with four valves per cylinder and two overhead camshafts. 4—Dinos four-cylinder aluminum engine with the starting-lighting-ignition unit at the front in line with the crankshaft

in. bore by $3\frac{3}{4}$ -in. stroke, are cast in a block with the barrel-type crankcase. The cylinder head is detachable, lubrication is by splash, and cooling by the thermo-siphon system. The Heil 25 hp., designed by Dr. Bergmann, represents a more costly and high-class type of small car. The cylinders, of $2\frac{3}{8}$ -in. bore by $3\frac{1}{2}$ -in. stroke, are cast in a block with the barrel-type crankcase, the whole casting being of aluminum with inserted cast-iron cylinder liners and inclosed manifolds. The overhead camshaft is completely inclosed and the crankshaft runs in two ball bearings. Lubrication is by a combined pressure and splash system with gear pump. The Tria, a combined starting, lighting and ignition outfit, is used, and cooling is by thermo-siphon.

Medium sized engines are built mostly with L-head cylinders with integral head. The Selve 32 hp. is a good example of this kind. The four $3\frac{3}{16}$ by 4-in. cylinders are cast in a block and develop 40 hp. at 2500 r.p.m. The valves are strongly inclined, to improve the form of the combustion space. A passage is cast in the crankcase for preheating the carbureter air.

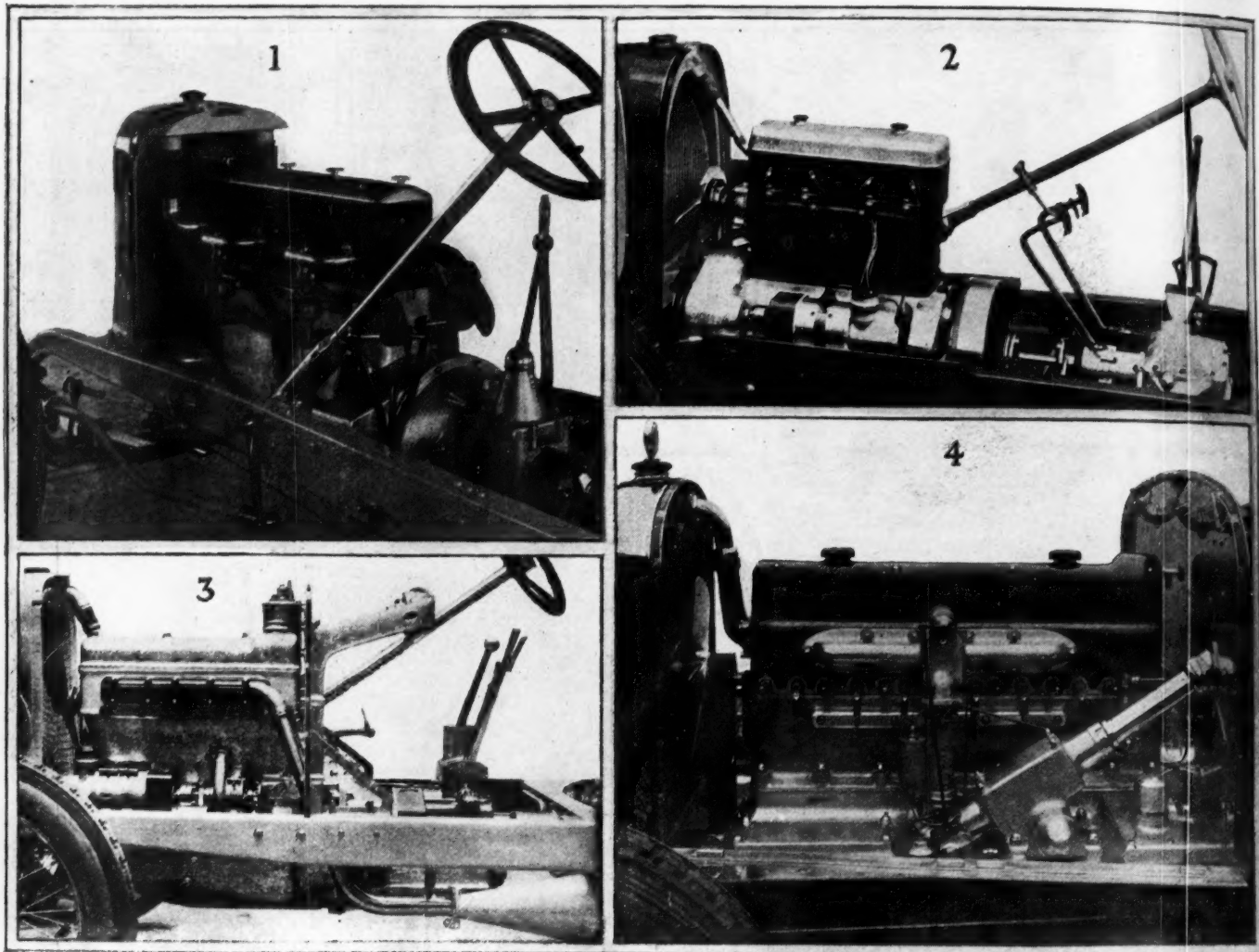
For large-sized, four-cylinder engines, overhead valves with inclosed overhead camshaft are now in favor, a representative of this class being the 50-hp. Phaenomen, with all-aluminum cylinders cast in a block with the upper part of the crankcase, and the Dinos 35 hp., a product of a concern controlled by Hugo Stinnes. The engine of the latter carries the starting, lighting and ignition unit at its front end. The Dinos engine is remarkable on account of its smooth exterior. The 40-hp. N. A. G. engine is similar in design but has cast-iron cylinders. The most interesting type of four-cylinder

engine is the Simson 40 hp., built by the arms works of Simson & Co. This engine is intended for sport models and has four valves per cylinder. The valves are arranged in the detachable cylinder head, inclined at an angle of 20 deg., and are operated by two overhead camshafts. The spark plugs are located in the center of each cylinder head. The $2\frac{3}{4}$ by $5\frac{1}{16}$ -in. cylinders are of cast iron and develop 40 hp. at 2600 r.p.m. Buyers are given an option on a spare cylinder head with two valves per cylinder.

The number of six-cylinder engines has increased and is now about one-fifth of the total. A good example of a six-cylinder L-head engine is the Dux 50 hp. The valves are inclined and operated by one camshaft on the left side. The valve mechanism is inclosed but can be reached through two covers, and the exterior of the engine is almost as "clean" as that of an overhead valve engine. The six cylinders are cast in a block with integral heads. The crankcase is of aluminum and divided horizontally. Water circulation is by pump and the water header on the cylinder, which is of cast aluminum, is provided with cooling ribs.

Overhead Camshafts Common

Most of the six-cylinder engines have an overhead camshaft and the valves located in a detachable cylinder head. A prominent representative of this class is the new 70-hp. Audi, with $3\frac{1}{2}$ by $4\frac{3}{4}$ -in. cylinders. The engine of this car possesses many interesting features. The six aluminum cylinders are cast in a block and have pressed-in steel liners. The valves are arranged vertically in one row in the cylinder head and operated by



1—Hansa Lloyd eight-cylinder vertical aluminum engine. 2—N. A. G. four-cylinder overhead valve engine. 3—Phaenomen 12-50 hp. four-cylinder aluminum engine. 4—Inlet side of Audi six-cylinder 70-hp. aluminum engine

an overhead camshaft. Both the pistons and the connecting-rods are of light metal. Lubrication is by pump and a special cooling device is provided for the oil. In the inlet manifold there is an air valve which is connected with the spark and throttle linkage. The carbureter is fitted with an air-cleaning device. Cooling water circulation is by pump, and the radiator is mounted on the engine crankcase instead of on the frame in order to protect it against excessive stress.

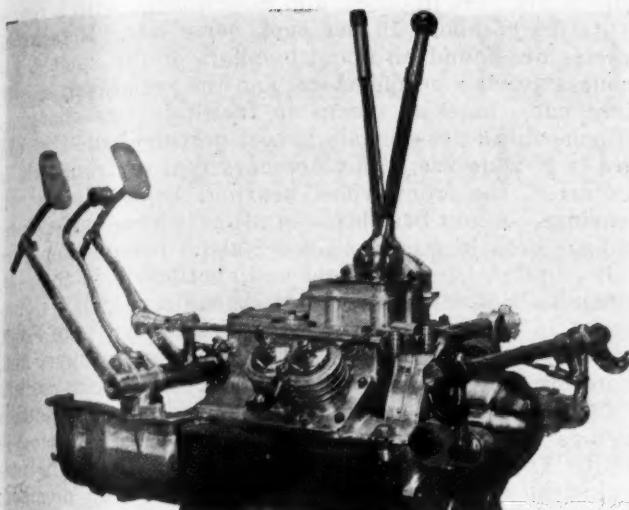
Straight Eight Produced

Multi-cylinders have not been popular in Germany so far, but the Hansa-Lloyd works, one of the biggest in the country, after extended tests have decided to produce only a straight eight model, discarding the four-cylinder engine built by them during the last twelve years. The eight cylinders, of 2 13/16-in. bore by 5 1/16-in. stroke, give the engine an output of 80 hp. at 2200 r.p.m. The aluminum cylinders have cast-iron liners and are cast in a block with the crankcase. The detachable cylinder head is of cast iron and contains the valves, which are operated by an overhead camshaft. Two carbureters are fitted, each having its own inlet manifold, through which it supplies four cylinders. Cooling is by thermo-siphon circulation, which is unusual for such a powerful engine, and two water outlets are provided. A four-bladed fan is arranged on the front end of the camshaft and driven through a small friction clutch. The flywheel is cast with fan spokes,

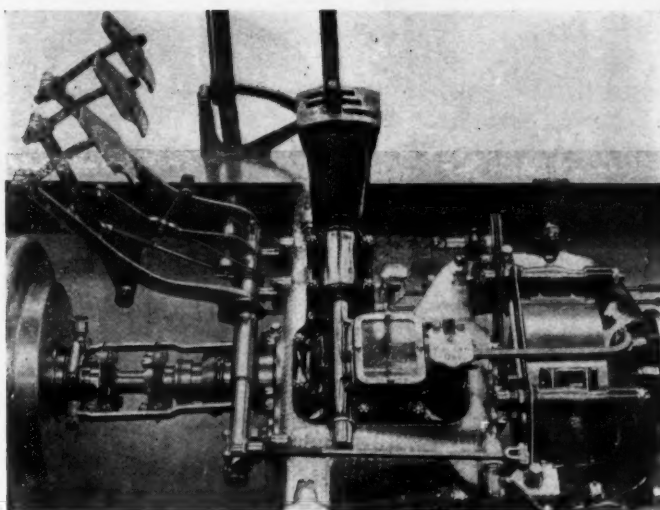
but this fan is intended only to remove the foul air from under the engine hood. The radiator is flat and is located behind a V-type dummy radiator, a radiator shutter being located in the space between the radiator and dummy. This design combines the appearance of V-type radiators, favored by German buyers, with the utility of the radiator shutter. The shutter is invisible and, therefore, does not detract from the lines of the car. It is interesting to note that the eight-cylinder chassis weighs only two-thirds as much as the four-cylinder chassis which it succeeded.

The Mercedes car not being exhibited, there are only two models with steel cylinders, Exor and Joswin. Detachable cylinder heads are found on more than one-fourth of all engines and light metal pistons on two-thirds. L-head engines are in the lead, followed by engines with all valves in the head and a few which have one valve in the head and one in a side pocket. Crankshafts mostly have three babbitted bearings in the larger four-cylinder engines and two in the smaller ones. The crankshafts of six-cylinder engines generally have four babbitted bearings, less frequently, seven babbitted bearings or three ball bearings. Camshaft drive is by spur gears, helical gears or silent chain, all three having substantially equal representation. Only one-tenth of all engines are not manufactured by the car maker, and even small factories with a yearly production of only 100 cars make their own engines.

The V-type radiator, which is very expensive and im-



Audi gearset with tire pump built in



Dux separately mounted gearset

practical in many respects, has lost ground, and about 25 per cent of the cars now have rounded or flat radiators. Engine lubrication is mostly by the combined pressure and splash system, the all-pressure and straight splash system being very rare. Two-thirds of the oil pumps are simple gear pumps. About half of the models carry an oil pressure gage on the dashboard, the rest have no oil circulation indicator of any kind.

More than one-third of all the passenger cars use the Zenith carburetor, the next in order of popularity being the Pallas. Maybach and Grade use their own carburetors. The carburetor control linkage in almost all cases is the Faudi, the joints of which can be disconnected without tools. In smaller cars, the fuel tank is arranged below the cowl, and in larger cars at the rear end. One-third of all cars have fuel feed by gravity. Vacuum feed is quite popular, one car has exhaust pressure feed, several have air pressure feed, and the remainder have some combination system, such as vacuum and pressure feed, one of these being a reserve feed.

Magneto Ignition

Plain magneto ignition is used on more than three-fourths of the engines, combined ignition and lighting generators being found on about 10 per cent of the cars, while a few use the Tria combined lighting, starting and ignition unit. Dual ignition is used only on two models, the Maybach and the Joswin. Bosch magnetos are far in the lead and are followed at a wide interval by Eisemann, Mea and Siemens & Halske. Spark control is by hand lever on two-thirds of the models, the remainder having fixed spark ignition or automatic control.

Acetylene lighting is still being used on two cycle-cars, but on full-sized cars the electric lighting and starting system is now a regular feature, the Bosch system being most widely used. Usually the lighting generator is located at the front end of the crankcase of the engine and operated by belt or gear, while the starting motor is located at the rear and drives to the toothed flywheel rim. The battery in most cases is carried on the running board, which detracts somewhat from the smoothness of the body lines, but before long all batteries will be carried on the chassis frame.

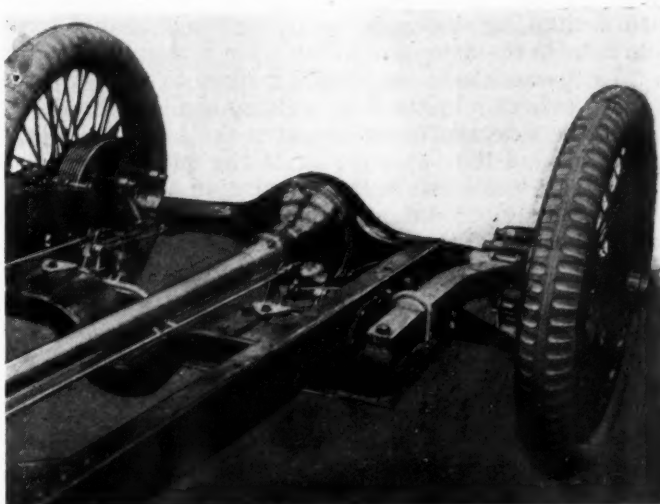
Larger cars often have engine-driven tire pumps, mounted either on the engine or on the transmission. The latter arrangement is probably the better one if the pump is sufficiently accessible. On the Audi the pump is arranged in the transmission and driven by a transmission shaft and gears.

Cone clutches are used on two-thirds of the cars and leather lining is used in most cases, asbestos lining not having gained much of a field yet. Metal cones are used on four models, two Adler and two Apollo. Multiple disk-in-oil clutches are used on one-fifth of the models and dry single plate on one-sixth, which is also the representation of the dry multiple plate type. The Maybach car has an expanding clutch. A clutch brake is provided on slightly more than half of the models.

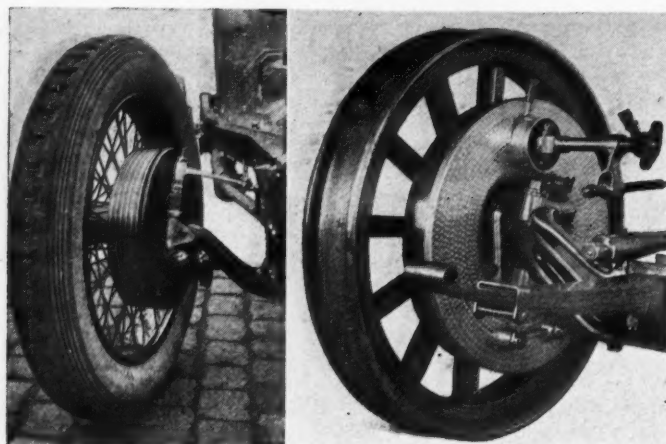
Unit Power Plant Popular

While unit power plant construction has grown in favor, only one-fourth of the models have such powerplants as yet. Most cars have a separate transmission, an example being the Dux illustrated herewith. Interesting features are the speedometer drive, the very wide transmission brake and the lubrication of the universal joint by a separate oil cup or trough on the transmission case. The unit-with-axle transmission is found only on the NUG and the Rumpler cars, the transmission in the latter case also being a block with the engine. The transmission bearings are ball bearings almost throughout.

In two-thirds of the cars four gear speeds are provided, and three in most of the others, only a few of the small cars having two speeds. In the Maybach car, built by the designer of the Maybach aircraft engine,



Rear end of Pluto chassis showing quarter-elliptic springs



Dux and Audi front wheel brakes

the electric starting motor is made powerful enough for starting the car, and after the engine has picked up its cycle all ordinary driving is done on the throttle. However, a two-speed gear is fitted, with one forward gear for very steep hills and for starting on grades, and one reverse gear, both gears being operated by pedal. Gear control is for the most part by a lever moving on a quadrant, but one-fifth of the models now have the ball mounted gear lever. The Soden transmission, with all gears constantly in mesh, the gear being selected by a finger lever and automatically engaged by means of dog clutches, is provided on a few models only. About 90 per cent of all cars have transmissions of the makers' own construction.

Shaft drive is generally used, only five models of small cars having chain drive. Shaft drive with one lubricated inclosed joint is used on four-fifths of all models, the remainder employing either one dry disk joint or two joints, the latter also being usually of the lubricated inclosed type. The Selve car has a lubricated joint with ball bearings. In the case of shaft drive with a single joint, the torque, as well as rear axle thrust, is mostly taken up by the propeller tube, whereas if two universal joints are used the drive is generally taken by the rear springs. The final drive is almost equally divided between straight and spiral bevel gears, worm drive being used only on three models. The bearings of the rear axle are ball bearings almost exclusively, and three-quarter floating and semi-floating axles are preferred. Dr. Rumpler, whose exhibit attracted much attention, has simplified and improved his design of transmission-axle with oscillating shafts, by omitting the diagonal truss rods outside the axle case which were formerly provided to take the rear axle thrust and torque. These stresses are now taken up by the wide guiding shells at the inner end of the axle shafts which carry the bevel gear that swings around the bevel pinion of the final drive. The double truss rods seen in the illustration of the Rumpler axle serve only for stiffening to axle tubes and for transmitting horizontal thrust to the guiding shells, not to the axle case proper.

Cast Steel Housings Used

Rear axle housings are usually made of cast steel, sheet steel and aluminum being seldom used. The bevel gear type of differential is preeminent. A ball type of non-skidding differential is used on about 10 per cent of the cars, while the spur gear differential is used on only three models.

Artillery wood wheels are most extensively used; one-third of the models have wire wheels; hollow-spoke

wheels are next in order, and disk wheels, with a representation of about 10 per cent, come last. Detachable wheels are found on about one-half of the models, demountable rims on one-third, and the remainder, mostly light cars, have no means to facilitate tire changing. Clincher bead tires remain almost universal and the cord tire is in wide use. The Mercedes type of front axle is preferred, the front wheel bearings being always ball bearings. About two-thirds of all cars have half-elliptic springs both in front and rear; about one-quarter have half-elliptic springs in front and cantilevers in the rear. Quarter-elliptics are used on only eight models. Cantilevers in front are fitted on the Rumpler and Faun. Spring gaiters are not fancied by the German buyer and, therefore, not provided by the maker. The Heim car has a three-point suspension of frame, with two standard springs behind and a double elliptic transverse spring in front. The front axle is held in position by two longitudinal strut rods connecting to the frame side members through rubber bumpers. The screw and nut device of steering gear is mostly used. The preferred position of the steering post and gear level is still on the right side, but center control in combination with right or left steering is growing in favor. The Hansa-Lloyd works were the first firm in Germany to use left-hand steering and center control, having adopted this feature twelve years ago.

Front Wheel Brakes Gain

The use of front-wheel brakes is gaining steadily and at present about one-sixth of all cars are either regularly equipped with them or can be furnished with them at the buyers' option. Two good examples of front-wheel brakes are the Audi and Dux. Both types are completely inclosed, have inclined steering pivots, facilitating the steering, and are operated by cable and rods. A special brake equalizer is provided, so that the left front and right rear wheel are always applied equally, as well as the right front and left rear.

The standard braking system still consists of a pedal-operated transmission brake and a lever-operated rear-wheel brake. One-fourth of all cars have both brakes acting on the rear wheels. Wire cable is used on about one-sixth of the models.

Following is a table of prices of cars exhibited at the show. These prices apply on cars sold in Germany. For export the German luxury tax, amounting to 15 per cent, must be deducted:

Elite	.....6 cyl. 55 hp. open body.....	\$7,000
Adler	.....4 cyl. 60 hp. open body.....	6,500
Will Erdmann	...6 cyl. 56 hp. open body.....	6,400
Dux	.....6 cyl. 60 hp. open body.....	5,600
Steiger	.....4 cyl. 50 hp. open body.....	4,000
Benz	.....6 cyl. 40 hp. open body.....	3,880
Heim	.....4 cyl. 32 hp. open body.....	2,750
Mausier	.....4 cyl. 24 hp. open body.....	2,500
Turbo	.....5 cyl. 32 hp. air cooled open body..	2,200
Schebera	.....4 cyl. 18 hp. open body.....	1,950
Pluto	.....4 cyl. 15 hp. open body.....	1,500
Peter & Moritz	...2 cyl. 20 hp. open body.....	1,250

THE Industrial Heating Congress recently held at Paris adopted a number of resolutions, one of which relates to the use of the higher heat value in making tests of fuels. The combustion of the sample is to be considered as taking place under constant pressure and the products of combustion are to be reduced to a temperature of zero deg. Cent. at 790 mm. of mercury atmospheric pressure. In view of the fact that more recent determination of the specific heats of gases have not given results in close agreement with each other the Congress decided to stick to the values of Mallard and Le Chatelier.

Low Frames, Air-Brakes and 6-Cylinder Engines Feature New Buses

Few truck chassis now offered for passenger transportation. More power, less vibration and better riding qualities are considered. Federal, International, Yellow, Pierce-Arrow and Acme show new models at Atlantic City. Many changes in Mack, White and F.A.C.

By Herbert Chase

SIX-CYLINDER engines, lower frames, air-operated brakes, and some front-wheel brakes are among the important new features of bus chassis design exhibited in connection with the annual convention of the American Electric Railway Association at Atlantic City last week. Body, as well as chassis improvements, are numerous and indicate that there is a growing appreciation of the need for better riding and more comfortable buses.

Most of the twelve bus exhibitors showed de luxe bodies, which are, to a considerable extent, patterned after closed bodies used on passenger cars of today rather than after street car practice, although there is still a predominance of the type which resembles the trolley car in general lines and seating arrangements.

Nearly all of the bus chassis makers have come to realize the need for getting away from characteristic truck construction and have come to a design properly adapted to passenger transportation. This has involved making lower frames, longer and flatter springs, engines which are freer from vibration, on account of better balance, and smoother operating brakes. A majority of frames on the newer jobs are kicked up over the rear axle, but some builders have made it a point to keep a straight frame in order to facilitate body applications, at the same time bringing the top of the frame as close to the ground as adequate axle clearance will permit.

In the case of buses which are intended to make fairly high speed and must have more power than is ordinarily obtainable from a four-cylinder engine which is sufficiently free from vibration, a six-cylinder engine has been fitted, and even in some chassis designed chiefly for city service a six is used in preference to a four, presumably on account of the relative freedom from vibration which

it is sought to obtain. Federal showed two chassis with six-cylinder engines, while Pierce-Arrow, Acme and Fageol each had one. The last-mentioned company furnishes either four- or six-cylinder chassis. The Yellow Coach Mfg. Co. exhibited only four-cylinder jobs, but showed drawings of additional models soon to be added to their line, one of which, it is understood, will incorporate a six-cylinder Knight engine.

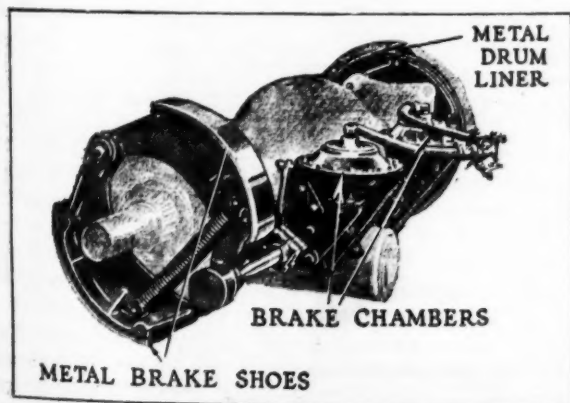
Brakes Being Improved

Brakes seem to be undergoing much the same sort of changes in detail and effectiveness that are apparent in the passenger car field, even to the addition of front-wheel brakes in some cases, but in the bus field there is a considerable amount of interest in air-operated brakes which, perhaps, is engendered by the rapidly growing demand for buses which is coming from street railway companies accustomed to air-brake equipment. Three of the chassis shown, Fageol, Garford and International Harvester, were equipped with air-brakes, all of these being of Westinghouse manufacture. In at least two of these the application is made as an extra at additional cost, and other makers are following a similar procedure, though not showing chassis so equipped.

In the Fageol installation the brake chambers, containing the flexible rubber diaphragms to which the air pressure is applied, are carried on the rear axle housing. The stems attached to the diaphragms are linked directly to the brake camshafts. The latter are arranged back of the axle center in this case. Braking surfaces in this installation are both metal, a step which has been found desirable, it is said, to minimize wear and render adjustment and replacement less frequently required than with asbestos fabric linings. A mild hot-rolled steel is used for the shoe surface, as well as for the replaceable lining which is fixed to the inside of the brake drum. The friction surfaces, it is said, soon become glazed and wear for a comparatively long time.

On the Garford chassis the air-brake chambers are mounted on the chassis frame and the brake shoes have the usual asbestos fabric facings. This construction makes it unnecessary to use flexible air hose connections such as are employed in the Fageol installation.

Aside from the Yellow Coach Mfg. Co.'s bus chassis, which has front-wheel brakes with mechanical operating means applied as extra equipment, the only chassis shown with front-wheel brakes was the new product of the International Harvester Co. In this case a modified Shuler front axle and brake design is employed. Instead of the helical face cam on a lever turning about an extension of the knuckle pivot a direct-acting wedge is substituted. This wedge is arranged to operate two toggles which ex-



Installation of Westinghouse air brake chambers on rear axle

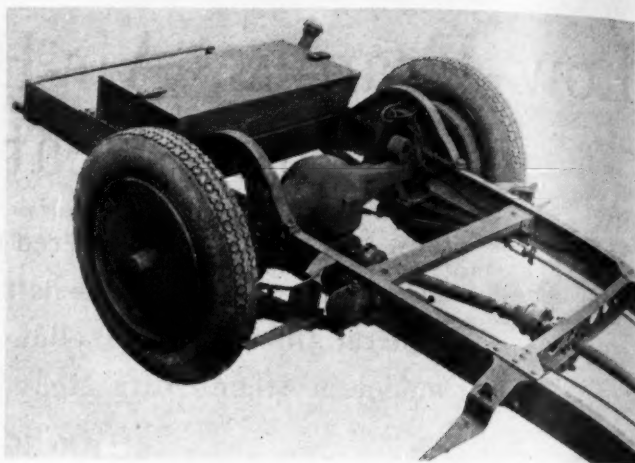
pand the internal band with fabric facing. The wedge is actuated by the stem attached to the diaphragm in the brake chamber which is carried by an arm on the axle yoke. This diaphragm has an area of 6 sq. in., as compared to 24 sq. in. for the diaphragms which actuate the rear brakes. Consequently, assuming a similar operating mechanism for the rear brakes, the pressure on the latter is much greater than on the former, and in consequence the front brakes are not applied with the same severity as the rear set. This is counted upon to prevent locking of the front wheels.

A special pedal, similar to an accelerator pedal, is generally used to control the valve which operates the brakes. In one installation no other means than air for applying the wheel brakes is employed, but in other cases the usual pedal is also connected by positive linkage to wheel brakes so that these can be operated either by air or by foot pressure.

Some Prefer Propeller Shaft Brakes

Mack, Garford, Pierce-Arrow, International and New York Transportation Co., makers of Fifth Avenue Coach Co. buses, among others, employ propeller shaft brakes. Some of these brakes have double-drum and band construction. Fageol and White, who are among the largest manufacturers of large-size buses, prefer a construction with all brakes on the rear wheels, and the new Federal jobs are similar in this respect. White has given up the propeller shaft brake, it is said, because it is abused in service.

Among the exhibits which attracted a very large amount of attention were those staged by Fageol, White, Yellow Coach, and Fifth Avenue Coach. The last two mentioned makers are the only ones who produce double-deck buses, the same men having been largely responsible for the design in both cases. The new Yellow 67-passenger coach chassis, which was recently fully described in these columns, is characterized by an exceptionally rigid frame and use of front-wheel brakes. Fifth Avenue Coach showed a new 61-passenger body on a 192 $\frac{3}{4}$ -in. wheelbase chassis. This is termed a Model 2-L, but is similar in most respects to the older Model L except that the wheelbase has been increased 20 in. to accommodate a body seating ten additional passengers. Other changes which are incorporated in the 2-L chassis include an increase in size of the main



Rear end of Fageol bus chassis, showing cast steel kickups over rear axle

bearings of the engine from 2 $\frac{1}{8}$ to 3 in., and an increase in the big end bearings from 2- to 2 $\frac{3}{8}$ -in. diameter. Special means for avoiding oil leakage at the rear main bearing have been added. Piston pins are now clamped in the connecting rod. The engine is the same as that employed in the Yellow bus chassis. This engine is now used also in the model J chassis as well as in the model L, 51-passenger, which is retained.

The clutch on all F. A. C. models has been improved by providing holes on the periphery of the casing, which facilitate inspection and assist in ventilation and consequent cooling of the friction surfaces. On models L and 2-L, brake equipment includes two 10 $\frac{1}{2}$ in. diameter by 4 $\frac{1}{2}$ in. face drums with contracting shoes and internal cooling vanes, mounted on propeller shaft. A contracting band brake is applied to 20 $\frac{5}{8}$ -in. diameter, 3-in. face rear wheel drums.

The internal gear drive rear axle with forged and cranked center member designed to give a low center of gravity is continued, but this unit is now made in three pieces, consisting of a banjo center and tube and two end fittings. Springs on models L and 2-L are 3 $\frac{1}{2}$ in. wide. Those in front are 48 in. long on both models, while the rear springs measure 56 and 60 in. respectively.

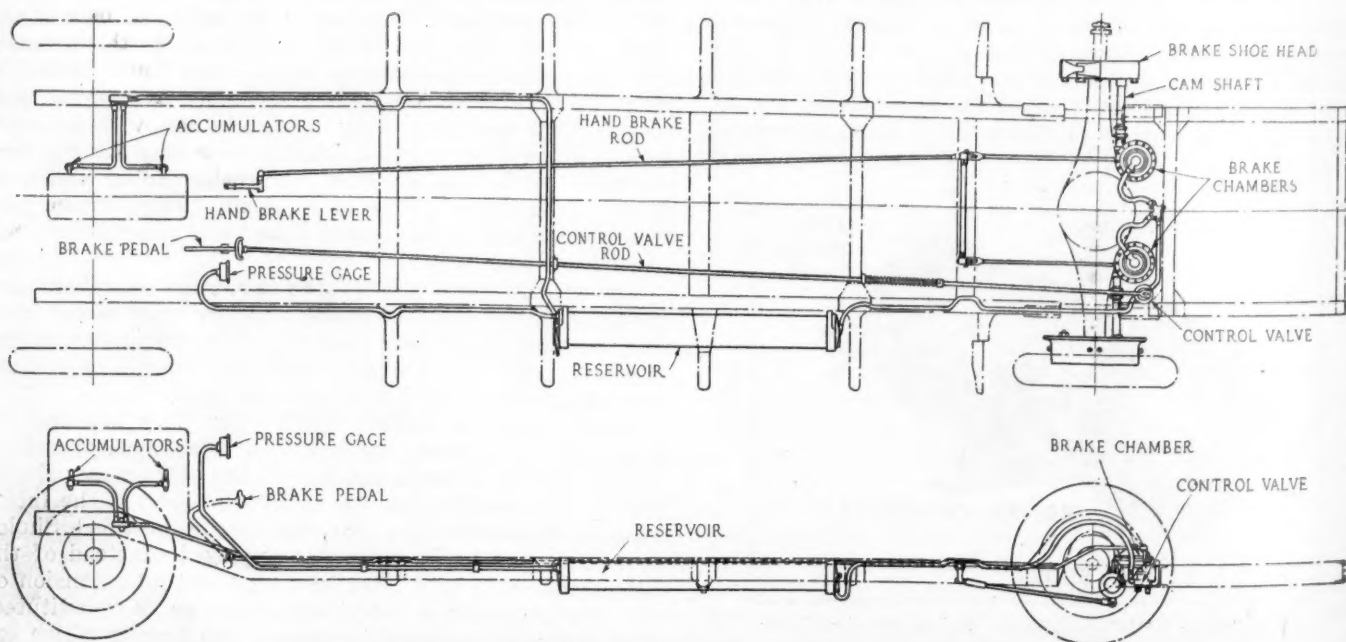
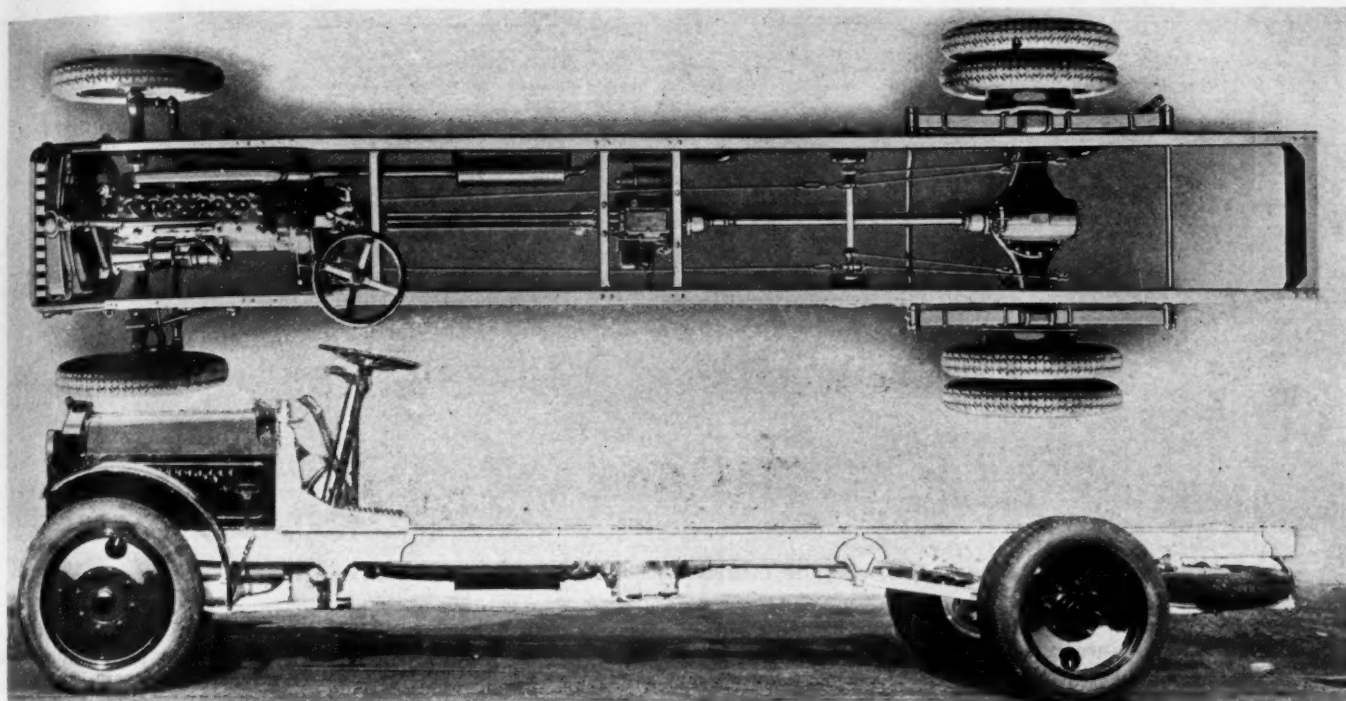


Diagram showing arrangement of braking equipment on Fageol chassis



Federal bus chassis with six-cylinder engine and narrow, low, parallel frame

Banjo shape transverse frame members are now in use in place of arched members back of gear set. The main frame has a maximum depth of 9 in. and is slightly kicked up over the rear axle. From the toeboards the frame is inclined upward to the point where the dash is attached. Engine and gearset are carried in a sub-frame supported at three points. This construction is said to have prevented difficulty with the fabric universal joints, which are continued. Steering gear, front axle and cooling system remain unchanged.

Removable Inclosure for Upper Deck

In the new 61-passenger body upper corners of window panels are rounded and ventilators are fitted above the windows. A special removable inclosure for the upper deck of the vehicle is provided as extra equipment if desired. 34 by 5 in. solid tires are now fitted all around.

On the model J F. A. C. bus, which is a single deck design, engine and clutch are the same as in the L models. The frame has been increased 2 in. in depth and now has box-shaped cross members. In this model the rear axle is a special design built for the Fifth Avenue Coach Company by Timken. It is a semi-floating type with underslung worm, mounted throughout on taper roller bearings. Space for spare tire mounting is provided under the rear end frame. All brakes in this model are carried on the rear wheels. They are 18 in. in diameter by $3\frac{1}{2}$ in. wide.

Federal exhibited two new bus models, both of which are fitted with six-cylinder engines. The chassis are similar in general characteristics, but one has 168-in. wheelbase and is intended to carry 18 passengers while the other has 190-in. wheelbase and carries 25-29 passengers. They are fitted respectively with Continental 6 M, $3\frac{3}{8}$ x $4\frac{1}{2}$ in., and Continental 6 B, $3\frac{3}{4}$ x 5 in. engines.

The Timken under worm drive rear axles are used on both models, that on the small bus is a No. 6460, semi-floating type, with $59\frac{1}{2}$ -in. tread, and that on the larger chassis is a No. 6560, full floating type, with 60-in. tread. Borg and Beck, model RGX, clutches are used on both chassis, both have gearsets with four forward speeds and both are fitted with front axles made by the Federal Co. Internal duplex brakes are on rear wheels in both cases.

Springs in the rear of the lighter chassis are 52 in. long by $2\frac{1}{2}$ in. wide and the heavier chassis 54 in. x 3 in. Both models are fitted with radius rods.

The frame on the 18-passenger chassis is 25 in. from the ground at the dash and is fitted with five cross members. On the larger chassis the distance from ground to top of frame is 26 in. and there are six cross members. Both frames are straight on top and the side rails are parallel through the greater part of their length. Wheel equipment varies with the type of tire, 20-in. base Budd disk wheels being used when pneumatic tires are employed.

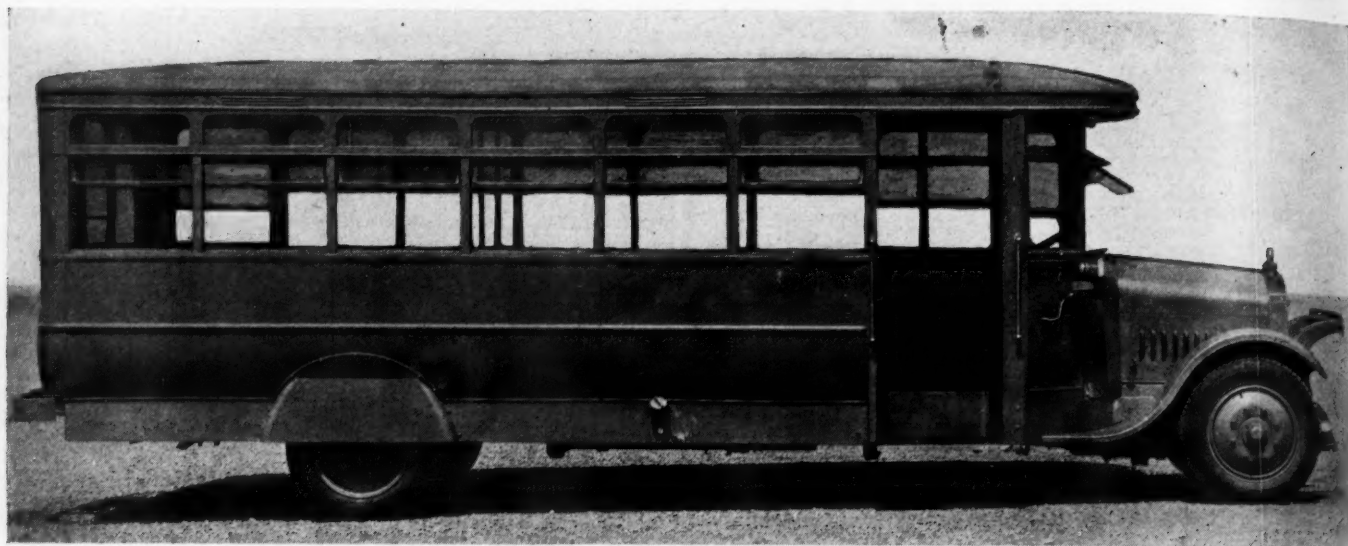
Both models are fitted with Remy bus type generators mounted beside the gear set and driven through an idler off the constant mesh gears.

Considerable interest was shown in the Fageol safety coach chassis, the chief features of which have been described heretofore in these columns. This chassis is characterized by the low frame construction. Height from ground to top of floor is 22 in., the first step being 14 in. and the second 8 in. high. Frame side rails are made from 6-in. 8-lb. channel and are not continuous from front to rear, but are broken at a point above the rear axle, where a cast steel arch or kickup is fitted to give adequate axle clearance. The frame is assembled by hot riveting. It is claimed that no frame failures have occurred in an aggregate of several million miles of service.

Four or Six-Cylinder Engines in Fageol

A unit power plant with integral radiator mounting is employed. Hall-Scott engines, constructed largely of aluminum in either four-cylinder $4\frac{1}{4}$ x $5\frac{1}{2}$ in. or six-cylinder types, are furnished. This engine has overhead camshaft and valves and pressure lubrication. A three-piece propeller shaft connects the rear axle with the gearset. This shaft passes through brackets attached to two transverse frame members. Each bracket carries a self-aligning ball bearing. There are four Spicer universal joints arranged as follows: one back of gearset, one back of each self-aligning bearing and one at rear axle.

Both axles are Timken products. That in the rear has an underslung worm and is a full floating type. It is fitted with two sets of expanding shoes. One set is arranged



Mack's new bus with lower frame and overgeared transmission

either for air or foot operation and employs metal to metal friction surfaces when air is used to operate it, while the other is hand operated and is faced with the usual asbestos fabric brake lining. Air brakes are not standard equipment but are supplied at extra cost. It will be noted from the accompanying cut that the pressure used in operating the brakes is obtained from the engine cylinder through the use of check valves termed accumulators. There is attached to the left side of the frame a brass storage tank from which the air passes to the brake chambers through a control valve which is foot operated.

Wheels are Budd-Michelin disk type and are fitted with 38 x 7 in. pneumatics single front and dual rear. The tread in the rear is 70 or 76 $\frac{3}{4}$ in., depending on type of body employed, and the wheelbase is 218 in. Rear springs have ten leaves and measure 56 x 3 in. Front springs have eleven leaves and measure 41 x 2 $\frac{1}{2}$ in. At the front end Gruss air springs are fitted.

Other parts and equipment include a Ross cam and lever type steering gear with 20-in. wheel and Delco starting, lighting and ignition equipment.

A variety of bodies are fitted. A feature of these is the one-piece cast aluminum cowl and dash unit, which includes a windshield and two narrow side windows which can be opened to give clear vision, in case of a severe storm in which the windshield cannot be kept perfectly clear. There are also ventilators at each side of the cowl while others are provided in the roof.

So-called "street car type" of bodies are designed to carry 29 passengers. Bodies of the de luxe type are also furnished. Some of these are fitted with cross seats which extend the full width of the body. In this case separate doors which extend down to the run-boards are fitted at each side. So-called "parlor type" models have wicker chairs with deep leather cushions, arm-rests and backs are supported on rubber vacuum cups, which give a cushioning effect and also hold the chairs in place on the floor. All Fageol bodies are characterized by low lines and most of them have the appearance of large limousines. A feature is the use of Duco enamel or lacquer for finishing.

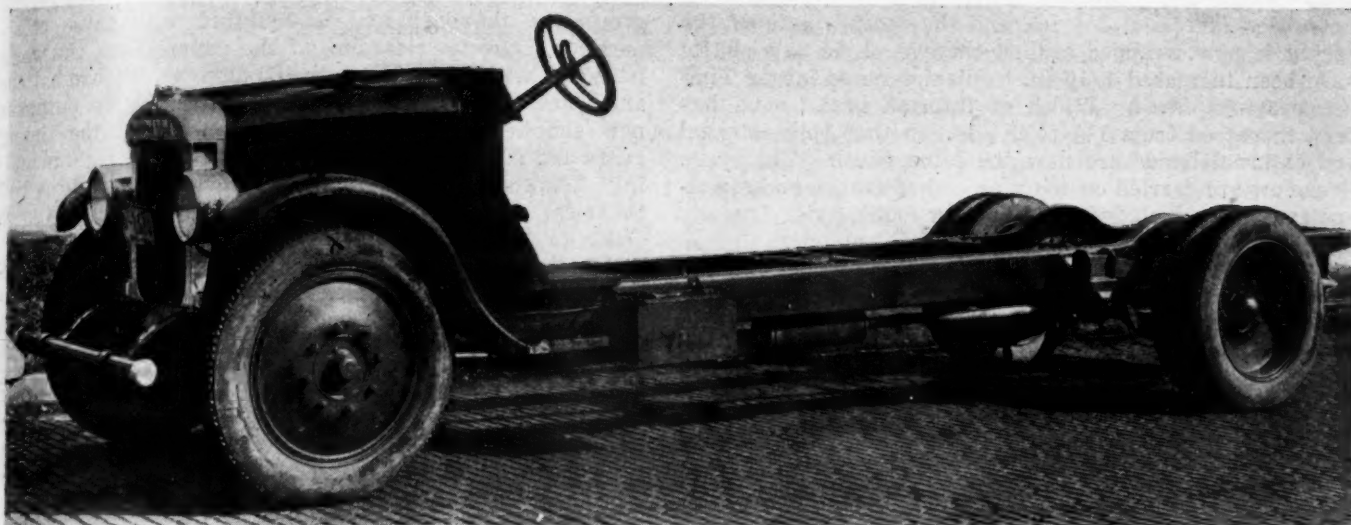
The White Company has modified its model 50 chassis and is marketing it as model 50-A. This is a low frame job designed especially for bus purposes. It has 198-in. wheelbase, a frame the top of which is 30 $\frac{3}{8}$ in. from the ground at the dash, and is fitted with outriggers giving an overall width of 74 in.

Among the changes incorporated in this chassis as compared to the model 50 may be mentioned elimination of the propeller shaft brake. Both sets of brakes now are located on the rear wheels. The foot brake is a contracting type and hand brake expanding. The propeller shaft is now fitted with three Spicer joints. Live rear axle shafts have been increased in diameter and larger bearings fitted. The steering gear is now made adjustable in respect to its inclination, and is fitted with a new steering wheel with short center levers and central horn button. A new aluminum instrument board in which all gages, switches and fuses are located is fitted.

Budd disk wheels with 36 x 6 in. pneumatic tires, single front and dual rear, are standard equipment. Electric starter, dash gasoline gage, eight-day clock, speedometer, two-cylinder air pump, barrel-type head lamps and front bumper are now included as items of standard equipment. Westinghouse air brakes are fitted as special equipment.



New 61-passenger double-decker on model 2-L F. A. C. low hung chassis



International Harvester bus chassis with Westinghouse air-operated brakes on all four wheels

Mack exhibited outside the show a new low bus chassis which is a modification of the former AB bus chassis marketed by the same concern. The height from ground to floor on this job is 25½ in. Wheelbase is 149½ in. Front springs are 41½ and rear springs 60¼ in. long. Shock insulators are used at the ends of all springs. Chassis weight is given as 3750 lb., and total weight with body 9480 lb. A drop front axle with underslung springs is employed. 32 x 6 in. pneumatics on Budd disk wheels are fitted all round, dual rear.

Overgeared Transmission on Mack

An overspeed gearset with .79 to 1 ratio on high gear is built as a unit with the engine, which is a four-cylinder, 4¼ x 5-in. type, designed for high speed bus service. The frame is a chrome nickel steel channel, truss type, made from 5/16-in. stock with 2¼-in. flanges and a maximum depth of 7⅞ in., tapering to front and rear. Electric equipment includes large capacity Leese-Neville generator, starting motor and large Exide battery. Front bumper is a hinged type supported on rubber goose-necks or shock insulators.

A Mack double reduction rear axle is employed. This is the same axle and has the same parts formerly employed except that the housing or carrier attached to the forged steel center is made flatter than heretofore in order to accommodate a lower body. This bus is not yet ready for the market but will be placed in production as soon as tool equipment can be prepared.

The Mack chassis is designed for a twenty-five-passenger body constructed from wood and aluminum by the Mack Co. Interior woodwork is mahogany finish with white ceiling.

Pierce-Arrow exhibited a new bus chassis fitted with a six-cylinder 4 x 5½-in. dual-valve engine which closely resembles in external appearance and general design that employed in the Pierce-Arrow passenger car. This chassis is fitted with a pressed steel frame with body outriggers. Top of frame is about 27½ in. from ground at dash. Wheelbase is 196 in. From the four-speed gearset the drive is through a propeller shaft with a two-drum brake supported astride of a tubular cross-member. The rear axle is an inverted worm type, which is understood to be built by Timken to Pierce-Arrow design.

Twin propeller shaft brakes are contracting type, foot-operated, while hand brakes are expanding on rear wheel drums. Chassis weight is given at 6100 lb. Standard equipment includes starter, generator, battery, bumper

and Standard steel wheels with cushion tires. Budd-Michelin disk wheels with 36 x 6 in. pneumatics, single front and dual rear, and two cylinder air pump mounted on gearset are furnished as extra equipment.

The new International Harvester bus, known as model 53, has 190-in. wheelbase and a ¼ x 8-in. pressed steel frame with eight cross-members. The four-cylinder engine has 4¼-in. bore and 5-in. stroke and is suspended from three points on the main frame. The crankshaft is carried in two large ball bearings. The engine is governed to run at 1600 r.p.m. It drives through a multiple disk clutch to a four-speed gearset, which is direct on third speed and 0.627 on high gear. The rear axle is an internal gear type with a forged steel carrying member, and ball bearings throughout.

All wheel brakes are internal expanding and are air-operated. As indicated above, there are brakes on the front as well as on the rear wheels. Hand brake is a contracting type mounted on propeller shaft. 36 x 6-in. pneumatic tires on disk wheels, single front and dual rear, are supplied.

Divided Steering Column on International

An unusual feature in this bus is the steering gear arrangement. The wheel shaft is quite short and is mounted at an angle of 30 deg. to horizontal. At its lower end this shaft carries a bevel gear which meshes with a similar gear on a vertical shaft on the lower end of which the usual worm and worm wheel arrangement is fitted.

Equipment includes a Remy lighting generator and starting motor, the former being mounted for driving off the gear set.

Acme Motor Truck Co. showed a new model K bus chassis with 200-in. wheelbase. The frame on this job is built up from ⅝-in. plate and 2 x 2 x 5/16 in. angle irons riveted together. It is kicked up over the rear axle and so hung that it measures 27 in. from ground to top of frame. This chassis is equipped with a Model 6 B, 3¾ x 5-in. six-cylinder Continental engine, 12-in. Borg & Beck clutch, four-speed Cotta gearset, inverted type Timken worm driven rear axle, Timken front axle, Ross cam and lever steering gear and semi-elliptic springs, 3 x 42-in. front and 3 x 64-in. rear. Both brakes are expanding on rear wheel drums. Westinghouse air brakes are furnished as extra equipment if desired.

Graham Brothers bus chassis now incorporates the following changes: A new frame in which the side rails are parallel except where narrowed at the front end of the vehicle. The rails are 1½ in. deeper. Rear spring centers

have been increased $1\frac{1}{2}$ in., and the second plate of the spring is now wrapped around the eye. Live axle shafts have been increased $1/16$ in. in diameter and larger Timken bearings fitted. Width of internal brake band has been increased from $1\frac{1}{2}$ to $2\frac{1}{2}$ in., so that both internal and external bands are now the same width. The spare tires now are carried on the rear end of frame, and standard equipment includes front bumper and heavier fenders, while Marshal springs are used in seat cushions.

But few changes are included in the Garford bus chassis, which is regularly equipped with a Buda special four-cylinder bus engine (or with a Yellow sleeve valve engine as special equipment). Rear springs now measure $3\frac{1}{2}$ x 60 in. The top of frame on this chassis is $25\frac{1}{2}$ in. from the

ground at the dash and is equipped with seven cross-members. Ground clearance at the underside of the worm is $7\frac{1}{4}$ in. with 36 in. tires. A 180-amp. hr. Willard battery and a new Remy lighting generator with 40 amp. output is now supplied. This generator is driven off the timing gears and is supported at both ends to insure rigid mounting. A special effort has been made to render fuses and electrical connections easily accessible to the driver in order to facilitate replacement.

Aluminum radiator shell and large head lamps are furnished as standard equipment. Budd disk wheels are standard with de luxe coach bodies only. The de luxe body is made by the Superior Motor Coach Co., whose plant in Lima is near that in which the chassis is built.

Experiences of Bus Operators Outlined by Committee

THE report of the committee on bus operation of the American Electric Railway Association, submitted at the convention in Atlantic City last week by W. J. Flickinger, assistant to the president of the Connecticut Co., contained an analysis of the experiences of seventeen street railway companies operating buses. Eleven of the companies used buses for feeders, seven for supplementary service and nine independently. Only three used them for all three classifications. Among the reasons advanced for the adoption of buses were the following:

Prohibitive cost of new paving and track work on feeder lines.

To give patrons better service by a shorter route.

To meet competition by independent buses.

To prove that the traction company should provide all forms of mass transportation.

To cover territory not covered by car lines and extend existing lines.

To substitute for light travelled rail lines.

To care for new residential districts.

To make possible through service between two cities.

These were the main factors involved in the adoption of buses. Some companies were influenced by several of them.

Proper Equipment Urged

"If we are going to sell to the public the idea that street railway companies, as the established transportation agency in the community, should be given the opportunity to furnish the entire transportation service," the report said, "the importance of having the proper equipment to provide the greatest amount of safety, comfort and convenience cannot be too strongly emphasized and it is pleasing to note that street railway companies are discarding the truck chassis and adopting the improved types as rapidly as the builders are developing them.

"In the further development of the chassis, simplicity and accessibility should be the chief aim of automotive engineers. It should be borne in mind that ordinary running repairs are made without removing the body and, therefore, easy removal and replacement of parts from underneath the chassis should be made possible.

"It is very desirable that time out of service be the

minimum. A unit repair system will most adequately meet this requirement. To facilitate this, attention should be given to standardization.

"Consideration must also be given to the peculiar requirements of a vehicle operated in passenger service such as low center of gravity, clutch and gear designs for frequent stopping and starting, adequate and economical power, and spring suspension to give maximum riding comfort under varying load conditions.

Chassis Design Discussed

"This report will not touch upon body development as we believe that each company will work this out according to its own requirements. In general, there seems no reason why the electric car body designs cannot be used as a base from which to develop a body which will give public satisfaction from the standpoint of safety, comfort and convenience. There will, of course, always be cases which will require specific treatment based on the particular transportation problem to be solved."

A sympathetic view of the problems of the street railways in the operation of buses was taken by H. W. Alden, president of the Society of Automotive Engineers in a discussion of the report. He said in part:

"The first thing that struck me was that the companies investigated were all street railway companies. I can readily understand that to have carried on as complete an investigation into the operation of outside or independent business might have been quite difficult and might have been contrary to the policy of your association. It would seem, however, that the picture presented by the report would, no doubt, have been somewhat different if independent companies had been canvassed, because there are a great many independent bus companies which are making money.

"The general summary of the results reported shows a net loss. We should not jump at the conclusion that this is a chronic and expected condition. Your report, however, does show that four out of the twelve companies had a revenue in excess of expense. Two of the twelve had such ridiculously low revenues that it would seem that they had tried to operate under impossible conditions.

"It would appear to us that your Association ought to extend its official investigations to independent companies. It is realized, of course, that the conditions under which many independent companies operate are free from some of the handicaps which the street railway companies are saddled with. On the other hand, the writer has always

been a firm believer in trying to get a pretty clear picture of what the other fellow is doing and making it a matter of permanent record.

Double-Deck Types Considered

"Furthermore, the investigation covers only single deck buses. Now there are many places where a double deck bus is to be desired, as evidenced by its success in London, New York City, Chicago and Detroit, in all of which cities revenues exceed expense by a comfortable margin.

"It is gratifying to us motor people, however, that in spite of the rather gloomy picture painted, the consensus of opinion among your operators seems to be that the motor bus is here to stay. The early years in any undertaking are, however, painful. They appear to be so in this case. However, I am informed that in 1921, composite results of fifty-two city railways showed 46.5c. per mile revenue and 45.7c. per mile expense. This is not a particularly rosy picture either.

"In analyzing the reasons cited by your companies' investigator as to why motor bus transportation was taken up, a good deal of light is thrown on the subject. These reasons can be roughly classified as follows:

- (a) To meet competition.
- (b) To give better service.
- (c) To fulfill an obligation resting upon a transportation system which has a monopoly of transportation.
- (d) To feed new territory at a minimum of investment expense.

These are all very sound and economical reasons. I venture to suggest, however, that in some cases, at least, the proper equipment was not chosen. Too much care cannot be given to this point. Differences in type of vehicle may easily mean the difference between red and black figures at the end of the year.

"Proper routing is another important element, probably not any too well understood, as yet. I am informed of one case in New England where a study of this factor of the equation changed a loss into a profit.

"Speed of operation is a very important factor not very thoroughly covered in the report. A change in motor size, gear reduction, etc., which would raise the average speed of a city bus, even as much as 10 per cent, might also change a loss into a profit.

"Nothing appears in the report on special forms of equipment for special services as such and these special services may, when properly catered to, mean the differ-

ence between a deficit and a surplus. The motor bus is excellently adapted to give express service, which is something that even double track street railways cannot give. The double deck buses, furthermore, create a traffic of their own as people delight in the upper deck comforts. They leave their motor cars at home and come into town on the buses. We know this from the results in New York, Chicago and Detroit. It attracts the sightseer as no trolley car or single deck bus can do. I mention these points simply to bring out the fact that if all of these features of motor bus transportation are studied and their revenue producing capacity made available, the net operating financial result might be quite considerably altered.

"We have found in Detroit that 25-passenger one man buses can be operated for very much less money per mile than even the small one-man street cars and they are going to be very considerably used for extension into outlying territory operated in conjunction with the street railway department of the city.

"I had expected a complaint from your committee that much of the equipment that the members of your Association had been compelled to buy was little more than built over commercial car chassis. The motor bus builder is open to criticism, in nearly all cases, in trying to do just this thing. Some of the companies, of course, have recently made up and developed special equipment. Bus service demands special equipment from end to end, designed primarily for bus service, because conditions and requirements are totally different to those resulting in merchandise transportation.

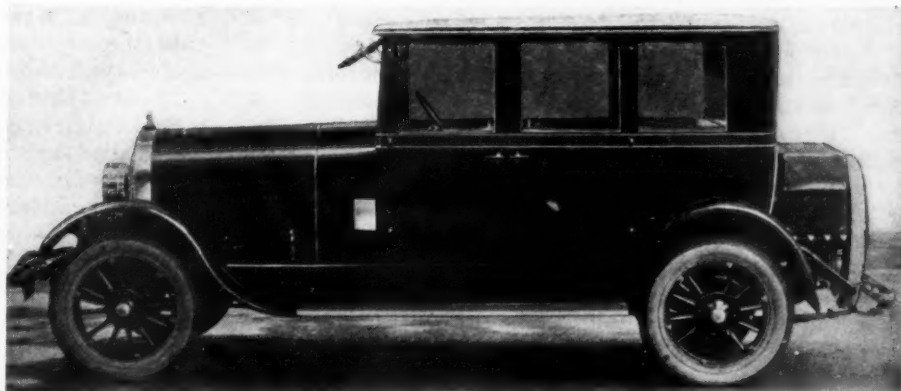
Variation in Depreciation

"On the subject of depreciation there is a wide variation in your practice. Surely these figures might be brought more nearly uniform. On the whole it seems as if the figures taken are unnecessarily high. Given the right equipment, that is one which will not soon become obsolete, a ten year life is not unreasonable when the vehicles are operated under good maintenance practice. Your table gives depreciation as about 13 per cent of the total expense on the average. This seems high. Of course, in the early days of any project, it is wise to err on the safe side, but it would seem that there was enough well established data, as evidenced by the London General Omnibus and the Fifth Ave. Coach Co. to indicate 7 or 8 per cent as being an adequate depreciation. I note that your committee advises its members to carefully study the factors governing depreciation. This is very timely advice."

Pilot Announces Four-Door Brougham

PILOT has announced a new closed model termed the four-door brougham, listing at \$2,495. A trunk rack is fitted at the rear and the usual metal guard bars are attached to the rear panel. The body is shown in the accompanying cut.

This body is mounted on 6-56 chassis with 3½ x 5 in. six-cylinder Herschell-Spillman engine. A feature of this chassis is the use of Master Eclipse supplementary springs which are said to improve materially the riding qualities.



Should Tire Price Cuts Be Advertised to the Public?

Dealer association feels very strongly that they should not. Some successful manufacturers agree with this view, but others answer query affirmatively. Survey shows that careful study is being given to problem. Retailer's needs are considered.

By Norman G. Shidle

EXECUTIVES of the tire industry have been doing some very deep and intelligent thinking lately on the question of advertising price declines and price increases to the public. Important makers are not in agreement as to the best policy to pursue, but a recent survey made by AUTOMOTIVE INDUSTRIES indicates a widespread study of this complex problem. Comments from leading tire makers, both large and small, indicate considerable difference of opinion as to whether or not price cuts should be broadcast. A few are on the fence or believe in taking action in each instance in accordance with the general situation at the time the cut is made.

One of the largest companies is the chief proponent of the latter method. The sales manager of this organization, in a statement addressed to dealers recently, says: "This company has at certain times in the past made newspaper announcement of price reductions. More frequently it has refrained from doing so. The policy which is to be followed at any particular time is always determined in light of conditions existing at that time and with the welfare of our dealers in mind.

"We see no reason to change this policy and expect to act in the future exactly as we have done in the past. . . . If price declines should occur in the future on our tires, we intend to make public announcement of them if it seems to the best interests of our dealers and ourselves that we do so. If it does not seem to the best interests of our dealers and ourselves, we will refrain from doing so."

Policy on Increases

He makes the point, also, that dealers cannot logically object to announcement of price cuts, so long as they want the manufacturer to advertise price increases.

Another big manufacturer feels even more strongly that reductions in list should be given to the public. Giving his reasons for this view, the sales manager of this company says:

"Inasmuch as it is the custom of the tire industry to advocate that the dealer should not carry more than a 30-day stock of tires, and in case of a price decline the dealer's purchases for 30 days prior to the decline are rebated down to the new level, we feel that it is not fair to the public to withhold announcement of the new reduced prices.

"Occasionally there may be circumstances which make such a course inadvisable, but they are the exception rather than the rule. When prices are increased, it is all in the dealer's favor and he has it within his power to apply the new price immediately or to give his customers the benefit of a low-priced inventory."

In direct opposition to these views are the opinions

expressed by George J. Burger, president of the National Tire Dealers' Association. He states:

"The National Tire Dealers' Association is opposed to the advertising of price changes to the public.

"We dealers are sold merchandise by the manufacturers, purchased with the understanding that it can be disposed of at a profit; and as there hasn't been a public announcement here recently of any price advance, then why should there be a public announcement of a decrease in prices?

Dealer Profits Saved

"The average tire dealer today is working on a very small margin of profit and his protection is only on 30-day purchases. Therefore this public announcement of a decline in price creates a strenuous hardship on the average dealer. There is absolutely no good business reason why the manufacturer should drop the price of tires and then go to the expense of spending thousands of dollars advising the public of such decline, which is met by each individual rubber company.

"It has not created any more business for the dealer, nor for the manufacturer, because the ultimate consumer is not in war times now and is buying tires only when in actual need."

One highly successful tire company supports quite fully the contentions made by the dealer association. The sales manager of this organization backs up his company's policy in this matter with a particularly well-reasoned and logical presentation of the basis for his views. This sales manager believes that tire price changes should not be advertised to the public for the following reasons:

"1—A price to the consumer, unless it is simply a suggested list and plainly marked as such, is illegal under the present legislation of the country. To avoid such legislation, consumer price lists are made only as suggestions. Therefore, to advertise them is to try to uphold the price in spite of such legislation and constitutes a technical infringement of such legislation.

"2—As they are only suggested, they are not adhered to and today are a joke, being used only as a guide from which discounts may be given to the consumer. Therefore they are unnecessary.

"3—The advertising of such price changes is uneconomic from two standpoints:

a—The margin spread between cost to the dealer and suggested price must be based on at least an average cost of doing business for all localities and in many cases on the maximum cost of doing business for any type of dealer.

If based on the average of doing business, the

spread is not sufficient for some dealers and is too much for others. This leads to selling discounts and not tires, which is a bad situation for any industry.

b—It is uneconomic for the manufacturer because it necessitates a guaranteed price clause with the dealer to protect him on an amount of stock on hand at the time price change is advertised if there is a reduction.

If price change advertised is an advance, the dealer gets the benefit of the advance, so the manufacturer takes the expense coming and going. In other industries, where price reductions are not advertised, there is no price allowance to the dealer and he averages in his resale price to the consumer.

"4—The advertised price is of no interest to the consumer for two reasons:

a—A tire today is a staple article and a consumer will only buy as his tires are used up. Advertising a lower price will not lead him to stock up and increase sales.

b—Because the advertised price is fictitious, he does not pay any attention to it—knowing that he can buy discounts when he is ready to buy.

"Therefore we have not advertised consumer price lists for a period of some years. We have furnished a suggested list—not over one to a dealer—where dealers insist on having a suggested price to work upon, but we ask them to either typewrite or print their own consumer lists.

"We believe that if the present practice of advertising consumers' prices were discontinued it would do a great deal toward clearing up the present situation in the industry."

Here is reiterated the idea that tires are a staple article, bought only on the basis of real need. Fundamentally, this conclusion is undoubtedly sound. Consequently, it follows logically the overloading of dealers is certain always to result in a demoralized retail market sooner or later as the possible sales are governed strictly by the actual need for tires.

List Prices Misleading

One of the smaller stable tire companies also backs up this view. The sales manager of this concern says:

"I have been in the tire business some twenty-six years and have always felt that the so-called consumers' list was the basis for considerable trouble, many losses, and the foundation on which the so-called gyp tire business was built.

"Such a method cannot do otherwise than encourage cut prices, confuse the consumer and in many cases lay him open to imposition.

"It has long been my impression that if a net price were made to the dealer and he were allowed to set his own selling price, based on the cost of doing business in his particular section, the nature of the competition that he had to meet and his own ideas of what a fair profit was, many of the underlying reasons for the present unsatisfactory condition of the tire business would be eliminated, including the advertising of price changes on the part of the manufacturers.

"I have never been able to see the logic of the manufacturers' advertising, either advances or declines, to the public. It would be far more satisfactory for the dealer to have an opportunity to adjust himself to these price changes in his own way and in keeping with his local condition. Competition would take care of the regulation of prices and prevent any unfair methods in his dealing with the consumer.

"If a dealer buys wisely and within reason, he is en-

titled to a profit on such goods as he buys in that way. If he buys in a speculative way when prices advance or if he is caught short when that occurs, he might reasonably be expected to take his chance on a loss that was directly traceable to an inclination to speculate or failure to exercise reasonable judgment. We believe that information regarding price changes might better be passed out to the public largely through the dealers themselves, with competition acting as a safeguard against unfair methods on the part of the dealer and for the protection of the public."

Another of the smaller organizations believes that the chief trouble lies in dealers being overloaded with tires and has adopted a policy of selling strictly on a cash basis. It advises every dealer "to hold his stock down and make no purchases beyond two weeks' supply."

Opinions Differ

Two makers of tires whose names are well known but whose sales are relatively small have slightly differing opinions about advertising price cuts to the public. One of them says, "We are open-minded on the subject and are not inclined to commit ourselves to a definite stand until the opinion among dealers is better crystallized.

The other is opposed to publicity of price reductions. The sales manager of this latter organization states:

"It is our feeling that when a merchant purchases our tires and pays for them, they are his property. We feel that we have no right, at a moment's notice, to publish to the public at large that our tires, which dealers have on their shelves, are now worth from 5 to 15 per cent less than they were the day before. Personally, I think it is a practice which should be eliminated.

"I do think that an expression from tire manufacturers would be well worth looking into in case of a price increase. Is the dealer going to announce an advance in prices if the manufacturer does not make some announcement, or should the manufacturer make a public statement of the increase? Naturally, the dealer would expect to get the increase should the manufacturer advance his prices."

A summary of the opinions expressed indicates that most important manufacturers have a clear vision of the dealer's viewpoint as regards announcement of price reductions and increases and that some of the makers feel the dealer to be entirely correct in his contention that reductions should not be made public.

Age-Hardening of Duralumin

ACCORDING to researches made by Marie L. V. Gayler at the National Physical Laboratory and recorded in a paper read before the Institute of Metals, the age-hardening of alloys of the duralumin type is due primarily to Mg_2Si , copper causing very little age-hardening. The effect of the magnesium and copper in the alloys is very important, since both reduce the solubility of Mg_2Si at high and low temperatures. Therefore, when copper and magnesium are present the maximum age-hardness, which it is possible to obtain from the binary aluminum-magnesium silicide alloys, must be reduced.

The age-hardening of alloys of the duralumin type takes place in two stages. First, aging at room temperature occurs, owing to the presence of Mg_2Si ; then if the alloys are further heat-treated at slightly higher temperatures the next effect is the coalescence of the finely divided particles of Mg_2Si , which causes softening, followed by the precipitation of finely divided $CuAl$, accompanied by further hardening.

Unit Container and Demountable Body Increase Transport Efficiency

Can be used to best advantage with special kinds of traffic. Some measure of standardization must be obtained on certain parts of railway and truck equipment. Development in England has been great. Successful installations show possibilities.

By F. C. Horner*

Consulting Engineer, General Motors Corp.

UNIT containers, usually thought of as individual boxes, which can be loaded and sealed by the shipper, transported to the consignee on truck chassis, freight car, boat or all three without disturbing the contents, offer great possibilities in the coordination of all transportation facilities.

The outstanding instances of unit container use in this country are to be found at Cincinnati, Ohio, and on the New York Central Railroad Lines.

The demountable body in various forms is in use to a limited degree in many parts of the country, and is probably more adaptable for general purposes of motor truck cartage than is the unit container. In other words, we can say that the unit container is commonly referred to in connection with traffic interchange between rail and road vehicles, whereas what we usually term a demountable body or flat is more often one used simply for interchange between motor truck and loading platform. As a matter of fact, to all intents and purposes a unit container is a demountable body when used with a motor truck, and a demountable body or flat can easily be used in an ordinary flat car on rail movement. The container car, however, is one fitted to accommodate a definite size of container and is not used with any other equipment.

One of the most up-to-date unit containers has an unladen weight of only two-fifths that of an oak container of equal capacity. It is constructed of duralumin, a material similar to that used in the German Zeppelins. Mr. Hugh Miller, Technical Editor of "World's Carriers," wrote about this container as follows:

The Vickers duralumin sling-van has not as yet been made of sufficient size for the furniture removing or like business so far as we know. The one we saw was about half the size of the furniture remover's sling-van, and is being used so far experimentally only, but we cannot conceive it as a failure.

The actual weight is about two-fifths that of an oak van of equal capacity; that is, assuming the weight

of an oak van as 1 ton, the duralumin van would weigh 8 cwt. only, and where the rate is 80 shillings (or about \$20) per ton for the goods transported, a quite usual rate for the class of goods carried in such vans between London and Liverpool, for instance, there is a direct saving of £2 8s. (or approximately \$12) without counting the freightage for the returned empty.

Besides the advantage gained in the reduction of weight, the Dartford Engineering Co., the container manufacturer, claims a great reduction in the cost of maintenance, though of course, that has yet to be proved.

The weather has no effect on duralumin and, with equal treatment, duralumin vans should outlast by a great many years those built of oak or other wood, though that also remains to be proved.

The question of strength is, of course, of very great importance. If actually subjected to load-tests, duralumin vans would carry three times the loads of the wooden ones, but the main idea has been to combine lightness, strength and durability, the last two relating to its power to resist impact blows against railway trucks, ship hatchways and docksides.

Vickers duralumin has a tensile-strength and hardness equal to good quality mild steel; it is not an easy metal to handle, and considerable experience in its heat treatment is required. The cost, of course, is high, as that of the metal is also; but, as we have explained above, the extra cost is soon accounted for by the saving in the cost of transport, and we anticipate that there will be a further compensation in the lower cost of maintenance. In the case of an industrial motor vehicle body, the weight can be got down nearly three-fifths, thereby giving greater carrying capacity and attendant advantages."

Maintenance Cost Low

In discussing these containers with Mr. Griffiths, the manager of motor vehicles for Lyons & Co., London, the first firm to use them, he told me that after one year's service the maintenance and repair cost was practically nothing, whereas the cost of repairs to their wooden containers was very high.

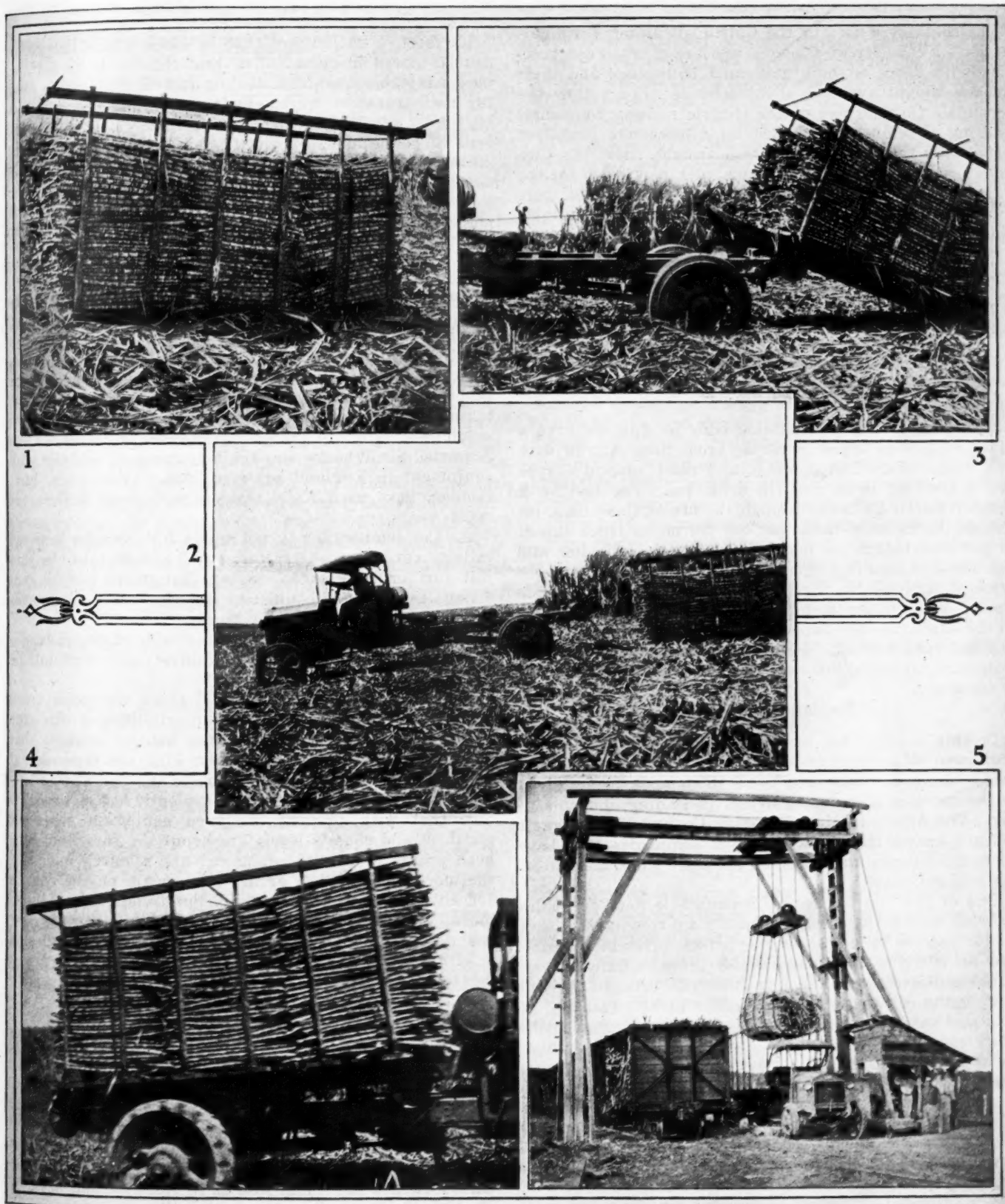
The New York Central type of container was designed primarily as a unit that would fit a special flat car, but of

A HIGHER degree of coordination between truck haulage and the older forms of transportation will mean increased truck sales. The unit container and the demountable body are the most important developments of recent years designed to permit a more efficient physical distribution of goods.

The author of this article reviews briefly the growth and use of these units, shows the advantages to be obtained from their application, and points out the difficulties involved in extending their scope.

*Paper read before a gathering of electric railway executives in Detroit, Sept. 13, 1923.

Handling Sugar Cane with a Demountable Body



The above photographs show the operation of a demountable body specially constructed for handling sugar cane in Cuba. The cane is piled on the body, as shown in Fig. 1. Then the body is attached to the truck by means of a rope (Fig. 2) and is pulled up onto the truck chassis over a series of rollers (Fig. 3). After being swung into place (Fig. 4) the truck carries the cane to the railroad, where the sugar cane is swung from the truck to the freight car (Fig. 5)

a weight and size easily adaptable to the conventional motor truck chassis equipped either with or without a body. I believe the latest type has a capacity of 7000 lb., the unladen weight being about 3000 lb.

Cincinnati Vehicle Described

The containers used by the Cincinnati Motor Terminals Co. have a capacity of $4\frac{1}{2}$ tons, and are of wood construction, with doors on both sides and both ends, and their unladen weight averages about 4000 lb. For a time the Terminals Co. and one of the electric railway companies entering Cincinnati conducted an interchange container service for the movement of l.c.l. freight. But the Cincinnati plan is essentially a motor truck movement for the transfer of trap-car freight between various rail terminals in what are quite commonly called demountable bodies.

Other types of unit containers are

1. Glass lined tanks, such as are used on the New York Central Lines and adaptable for milk and other liquids that can be shipped in bulk.
2. Containers for household goods, tobacco products, confectionery, and other commodities carrying a high tariff are in use in various parts of this country and Europe in a very limited way.

Referring to the demountable body or flat, we have a wider variety of types to choose from than is true with unit containers. The simplest and most adaptable type that I know of is an English invention. The London & South-Western Railway, through the use of these flats, increased the tonnage moved per day per motor truck almost 40 per cent within six months. Demountable bodies and flats are also used in England by Carter Patterson, the big express carriers, by the furniture and household goods movers, and in the cotton industry around Manchester. In the latter case the flats are often interchanged between rail and road vehicles. For protection from the weather, a sheet or tarpaulin tied over the bolts of cloths is all that is necessary.

England Is Ahead

In this country we have not developed this class of equipment to as great an extent as has been done in England. However, more and more thought is being given to the question of reducing delays in loading and unloading. The American Manufacturing Co. and L. K. Liggett Co. are among the most prominent companies that have been using demountable bodies for some time, and effecting real economies.

One of the latest types of demountable flats or bodies is being used to haul sugar cane. I am convinced that it can be used to fill a real need as a time saver in the cartage of miscellaneous merchandise between railway terminal and store door, and farm products between orchard and field and the city markets. The great advantage of this particular device is that it can be transferred to the truck chassis either from the ground or the loading platform with equal facility by power derived from the truck engine, and in addition could be hauled on and off an electric or steam railway flat car by the same method. Moreover, in effecting the transfer no overhead cranes are necessary, which means economy in cost of operation and space used at warehouses and at rail terminals—all very big factors in these days of high real estate values.

The principal advantage of the unit container adaptable to rail and road vehicles in the transportation of goods is the saving in labor costs by reduction in handling operations.

Other advantages of the unit container are the savings from loss and damage to goods, and the saving that can

be made on many classes of goods in crating and packing. This in turn permits of very material reduction in floor space required, which makes expansion of the business possible without further outlay in rental or property.

The advantages of the demountable body or flat over the conventional fixed-on types are principally savings in time and savings in floor and street space.

In short, I should say that in cases where the goods can be moved in open bodies, that the flat is by far the most adaptable and economical equipment that can be used for road transport work. Reduction in weight is also a big factor to consider when analyzing these hauling problems. The flat, or tray, with a sheet or tarpaulin covering affords ample protection to goods hauled comparatively short distances; moreover, it is possible to collect and deliver those goods at store doors in a much more efficient manner than can be done with a closed-in container or box body.

Detachable Unit Used

Another type of equipment which may be called detachable rather than demountable is the tractor semi-trailer, or six-wheeler. This equipment, which can be used to great advantage for many motor truck haulage operations, has come into quite common use in this country within the past few years. English road transport operators are also taking this invention up with great interest, and good results—only within the past two years, however, as the Scammell Six-Wheeler was the only company making such equipment in England prior to 1921. (Pickfords, Ltd., London, have used Knox tractors with semi-trailers for many years.)

As the semi-trailer is not made for transfer between railway car and road tractor, I will not go into the subject further here, except to say that under certain conditions this type of equipment contains many advantages over the conventional motor truck.

And now let us consider the other side of the picture—the disadvantages of unit containers and demountable bodies and flats.

Referring to bodies and flats, I think the motor truck owners have failed to realize the possibilities of this kind of equipment, largely because they usually conclude that overhead cranes or tackle of some kind are necessary at loading platforms, in order to make the operation really effective. They have, therefore, evidently lost sight of the fact that with properly designed equipment wherever platform and chassis levels are about the same, no overhead cranes or special equipment are required and, furthermore, that the bed or flat can remain on the chassis for any length of time desired, but is adaptable for removal where conditions permit. And now that we have found a way to transfer a flat or body from the ground to either truck chassis or flat car on rails with the power derived from the motor truck engine, another disadvantage has been overcome.

Cooperative Effort Needed

But going back to the unit container used for interchange between electric and steam railways and road vehicles, we have another story, and a problem requiring for its solution the closest cooperation of all transport agencies and all traders or merchants. I have discussed this subject at some length with both railway and road-transport men abroad as well as in America and my conclusions are that, without radical departure from present-day practice, it is only for special classes of traffic that the unit container can be used to advantage. Every railway man knows that one of the principal difficulties of operation is the unbalanced nature of the traffic, and in these circumstances alone the universal use of containers

would be costly and uneconomic. If the flow of traffic into and out of every town in the country was equal and balanced itself, they would be in quite general use in a short time.

Where a balanced bulk load traffic in both directions can be had, unit container equipment holds out great possibilities for saving in time and labor, and thus a more economical movement than is possible by conventional methods.

Unit Containers Advantageous

For instance, under a properly coordinated plan a merchant with stores in several cities might use unit containers to great advantage. But unless the containers can be loaded in both directions, the ultimate net saving will be very little and the venture may even turn out to be unprofitable, because the cost of transporting the empty is strictly waste effort. A container of light construction such as the duralumin one described is therefore highly desirable from this as well as other standpoints.

J. Pepper, the general manager of Northern Counties Committee, London Midland & Scottish Railway, sums up the whole subject of this class of containers in a clear and concise way in a letter to me as follows:

"You asked for an expression of opinion on the use of containers for goods traffic. My view is that in the course of time containers will be inevitable because it is one of the few means of reducing goods terminal costs. Their use implies that trade customs will have to alter and people will have to purchase in larger quantities before such devices could be effectively used, and the railway companies might be persuaded to offer lower rates for traffic carried in containers and conveyed at the owner's risk.

"Apart from the great saving in handling goods which would follow the use of containers, there should be a diminution in pilfering or thievery and a considerable

saving to senders through not having to provide individual packing. Take, for example, hosiery, boots, cloth and the like. Suitably designed receptacles could be loaded by the senders and sealed. I am afraid that a lot of water will have to flow under the bridge before we see containers in general use, because, as you know, great events move slowly and, due to the present attitude of the public toward the railway companies and carriers generally, transportation agencies probably would be expected to provide all the necessary receptacles at their own cost and pass the benefit on to the traders.

"As you will appreciate, the cost would be very heavy; because not only would containers of a suitable size have to be designed sufficiently strong to resist reasonable wear and tear and yet be light enough to make them mobile, but the railway vehicles would have to be redesigned in order to get a paying load, and road vehicles similarly would have to be made of such a size as would conveniently accommodate one or more containers.

"In other words, *some measure of standardization would have to be aimed at, and both containers on the one hand and railway and road vehicles on the other would have to be made to fit each other economically.*"

An analysis of this railway man's statement shows that, before the unit-container system can be used generally in transportation, the traders must be willing to bear their share of the cost of its development because they will benefit by it far more than the transport interests.

Finally, I would caution all those concerned with transportation problems not to jump to conclusions about these matters. Each case where containers and demountable bodies may be used should be carefully analyzed from every angle, because almost every case is a special one involving, perhaps, complications that do not appear on the surface but that can be satisfactorily solved through close study by transportation experts.

HOW TO GET A HIGH QUALITY OF PRODUCTION

By William R. Basset

President of Miller, Franklin, Basset & Company, Inc.

DO you rely entirely upon inspectors to make sure that every bit of your product is up to the standard of quality that you have set? If you do, you may get quality, but you have to bear a loss on the items that the inspectors reject.

One of the objections to the piece rate method of paying wages is that it stimulates production at the cost of quality. It is entirely possible in any industry to work out a method that combines a payment for quantity with a reward for quality.

One such plan is to have a sliding scale of piece prices, depending upon the percentage of perfect pieces. One concern worked out a scale under which the workman was paid \$2 per hundred if there were no rejections, \$1.90 for 99 per cent perfect, \$1.80 for 98

per cent perfect, and so on down. Under this plan the plant soon operated with an average of less than 1 per cent rejections by the inspectors, where formerly the rejections had averaged 8 per cent.

In one plant making an expensive product, the management laid great stress upon quality, and for fear of spoiled work, none on quantity. It devised a method designed to stimulate perfect quality to the utmost. Much to its surprise, after a couple of months the management found that not only was the quality raised, but that the amount of product was increasing. That bears out what I have often seen—that when a worker goes after high quality, quantity increases automatically. The skillful worker is commonly a fast worker.

New Double-End Threading Machine Operates Automatically

Has capacity for work up to $\frac{3}{8}$ in. in diameter and 10 in. in length. Work fed intermittently from magazine at rear to position in line with die heads. Power transmission through two-step cone pulley. Machine built by Grant Mfg. & Machine Co.

FOR simultaneously threading both ends of studs and rods on a quantity-production basis, the Grant Mfg. & Machine Co. has developed a machine that is entirely automatic in operation. The particular machine illustrated has a capacity for work up to $\frac{3}{8}$ in. in diameter and 10 in. in length. Two opposing die-heads, mounted on heads which are moved longitudinally to and fro along the bed, are employed for the threading. The work is intermittently fed from a magazine at the rear to a position in line with the die-heads and is clamped in this position by means of levers. The movement of these levers, the traverse of the heads and the operation of the work carrier are all obtained through the use of cams. In threading $\frac{3}{8}$ -in. rods on both ends to a length of $\frac{1}{2}$ in. a production of 30 rods per minute is claimed.

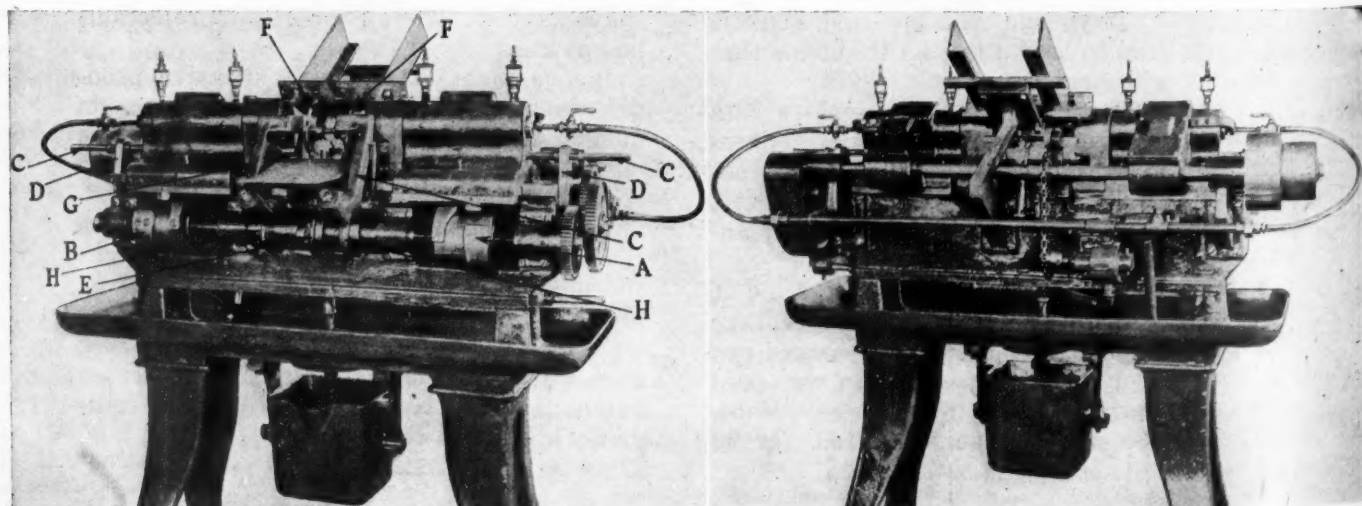
Power is transmitted to the machine through a two-step cone pulley at the left-hand end of the driving shaft, which runs along the entire length of the bed at the rear as shown in cut. The spindle in each head is driven directly from this shaft by means of a train of spur gears, the right-hand spindle being driven through three gears and the left-hand spindle through four. Hence right-hand threads are cut on each end of the work. The first gear in both trains slides on the driving shaft as the head traverses back and forth. The die head spindles are hollow and lubricant is constantly delivered through them and the die-heads to the ends of the work, the lubricant being delivered through piping and flexible tubing from a pump at the rear end of the machine which is driven by a silent chain from the driving shaft.

At the right-hand end of the driving shaft there is a train of change-gears which delivers power to a camshaft extending along the front of the bed. The cylinder cams *A* and *B* carry camblocks for controlling the forward and return movements of the right and left hand heads, respectively, by engaging a roller on the bottom of the heads. The camblocks are changed to suit threads of different pitch; for instance, when threads of 24 pitch are being cut, the cams must move the heads forward $\frac{1}{24}$ of an inch per revolution of the die-head spindles. The different thread pitches can generally be accommodated by simply changing the camblocks, but the change-gears can also be changed to obtain the proper rate of forward movement of the heads relative to the rotation of the spindles. It will be evident from this description that the die-heads are positively fed in conjunction with their rotation.

Control Mechanism

Not only is the rate of the forward and return traverse of the heads controlled by these cams but also the total length of their movements. The positions of the cams on their shaft is adjustable to suit the length of work by means of a thread and lock nuts. Obviously, the positions of the cams control the positions of the heads. Threads of different length can be cut on the ends of the work by providing camblocks to suit.

Opening of the die-heads at the end of an operation and closing at the beginning of one are accomplished by means of rods *C* and two adjustable stops on each rod. The rods extend through the heads and are connected to the die-



View showing both sides of new double-end threading machine

heads at the front end by means of a fork. At the end of an operation the forward movement of a rod with its head ends as the rear stop contacts with bracket *D* and causes the die-head to open. Similarly, at the end of the return movement of the head the second stop strikes the other side of the bracket and effects the closing of the die-head.

Work is delivered from the magazine to the threading position by means of the cam *E*, which actuates a roller attached to the front end of a link that extends through the machine to the rear. At the latter end the link is connected to a bell-crank, which in turn is fastened to a vertical rod which has a pawl at the upper end. This pawl engages a ratchet on a shaft which carries two disks *F* and thus causes the shaft to rotate intermittently whenever motion is imparted to it from cam *E* by means of the other members of the mechanism. Each disk *F* has six notches cut into its periphery and by means of these

notches carries a piece of work from the magazine into line with the die-heads every time that the pawl rotates the ratchets.

As the work reaches the threading position levers *G* are rocked forward by cams *H*, clamping the work firmly against two hardened pads and holding it there until the threading is completed. Then, as the rollers ride on the low portion of cams *H*, the levers swing forward again and release the work, which is now permitted to roll forward across the sheet metal into a receptacle. Hardened V-blocks are fastened to levers *G* to contact with the work. The rollers of these levers are backed up by coil springs which, in the event that work is clamped improperly for an operation or too large work is fed by error, etc., allows the rollers sufficient movement to eliminate the danger of breaking a part. The rocking levers pivot on bearings at the center of the bed.

General Motors Develops Porous Bearing Metal

A NEW porous oil-absorbing, copper-tin bearing bronze termed Durex has been developed by the General Motors Corp. This product possesses a large number of pores, which will absorb lubricating oils or greases up to 25 per cent of the volume of the bearing. Under test Durex is said to have been found of use in any place in which bearing materials are ordinarily used, and in some cases is reported to satisfactorily replace ball and roller bearings.

Pores, uniformly distributed throughout Durex, are claimed to give the material excellent absorptive qualities. An interesting demonstration of this characteristic is made by fitting an ordinary old-fashioned kerosene lamp with a Durex bushing in place of the usual cotton wick. The bushing can be lighted and will continue to burn as long as there is oil in the lamp.

Durex not only soaks up oil, but, what is more important still in a bearing, the oil will not drain out again. It is claimed that after a Durex bearing has been soaked in oil it will always thereafter present an oily surface. When the bearing surface has been wiped free of oil, in a very short time a coating of oil reforms on it. This ability to replenish quickly an oil film on its surface is an obvious advantage in a bearing, as this characteristic should insure against running dry.

Bearing of this type are reported to have run as long as 10,000 hr. at 2,000 r.p.m., on a $\frac{3}{8}$ in. shaft, loaded heavily, lubricated only with the oil contained in the bushing walls, but in some installations the supply of lubricant held within the walls of the bearing material should not be relied on for continual lubrication but should be considered as a reserve for emergencies. Durex bearings that are heavily loaded require an additional supply of lubricant.

By virtue of its ability to function as a wick, the bearing surface can be continually supplied with an evenly distributed film of oil by an ordinary cup oiler, with the oil hole terminating at the outside of the bushing, or by a wick oiler. For heavy duty bearings, when oil must be available in larger quantities than can be fed through the pores in the bushing alone, the oil duct can be led through the bushing to the shaft. Any kind of lubricating oils or greases can be used, the selection being governed by service conditions.

Makers of Durex state that it contains materials which are evenly distributed throughout the mass and that this

insures a bushing which will not gall and which has a low coefficient of friction, giving it unusual ability to resist wear. Bushings can be made in any desired size, the relation of wall thickness to length and diameter of bushing being governed by the principles applying to the design of ball bearings.

Durex bearings are installed in the following manner: The bearing is placed on a hardened plug of the desired size of the finished hole. The bearing and plug are then pressed into position in the casting or bearing receiver. The press fit is made from 0.003 to 0.005 in. After pressing into position, the plug is removed, leaving the hole of exact size and in proper alignment. This method of installation eliminates finish reaming.

According to the makers, Durex bearings give best results when the running clearance is not less than 0.0005 in. for shafts up to $\frac{5}{8}$ in. diameter and not less than 0.0015 in. for shafts $\frac{5}{8}$ to $1\frac{1}{2}$ in. in diameter. Best results have been obtained by using hardened and ground shafts; however, many installations are very successful, using cold rolled shafting. Users are cautioned against burnishing the bearing surface or using any method of machining that tends to close the surface pores.

Physical properties of Durex bearing metal are as follows: Brinell hardness, 30-40; scleroscope hardness, 15-18; modulus of elasticity, 2,500,000; weight 3.5 oz. per cu. in.; specific gravity, 5.40; oil absorption, 25 per cent by volume; compressive elastic limit, 2,000 to 10,000 lb. per sq. in. (depending on composition).

THE Bureau of Standards, at the suggestion of a group of metallurgists connected with the automobile industry, has taken up the investigation of the carburization of steel, a problem of great importance in this industry. The specific purpose of the investigation will be to determine whether or not the initial quality of a steel influences to any marked extent the results obtained in carburizing practice, as has been claimed by some commercial metallurgists. Specimens of "normal" steels, that is, steels which in the hands of these metallurgists prove to be entirely satisfactory, and of "abnormal" steels, those which gave results of a decidedly different character when subjected to the same carburizing process, have been secured. The preliminary work of cutting the samples, making examinations of the structure, etc., is under way.

Manufacture of Rubber and Pyroxylin Coated Fabrics Differs Widely

Calender used with former takes place of spreading knife employed with latter. Basic materials quite dissimilar. Khaki colored rubber coatings said not to be durable because of rapid oxidation. Black most common and most satisfactory color.

RUBBERIZED fabrics used in automotive construction differ from pyroxylin coated fabrics (the manufacture of which was described in *AUTOMOTIVE INDUSTRIES* for Aug. 2, 1923) not only in respect to the chemical and physical characteristics of the coating, but, in general, in the method by which the coating is applied.

Pyroxylin coatings are applied by passing the material several times under a knife which forms one side of a trough in which the pyroxylin solution is held. Drying, in which the solvent is evaporated, is required between coats and the process is necessarily rather slow as compared to one in which the entire coating is applied in a single calendering operation. Rubber coatings can be applied in the same manner as pyroxylin coatings, and this method is used in some cases, especially when a thin coat is desired, but most rubberized fabrics used for automotive purposes, especially for the top and side curtains of open cars and the deck or roof of closed bodies, have a coating which is applied in one passage through a calender.

The backing or fabric itself is substantially the same in automotive applications, whether a rubber or a pyroxylin coating is employed. The coatings, however, are entirely different both in respect to the basic materials employed and the method of manufacture. Pyroxylin is made from cotton which has been rendered soluble in amyl acetate (and other solvents) by treatment with nitric and sulphuric acids. The composition used in coating fabrics in the rubberized class, on the other hand, is made from numerous ingredients the most important of which is rubber. A considerable variety of mixes is employed, even by the same concern, depending

upon the character of service to which the finished product is to be put, the selling price and other related factors.

It is here proposed to describe the manufacture of rubber-coated Fabrikoid as conducted at the Fairfield Rubber Co. plant of the E. I. du Pont de Nemours & Co. The fabrics used are purchased to the same specifications and are subjected to the same inspection methods as those employed by the Newburgh, N. Y., plant of the same concern, as described in *AUTOMOTIVE INDUSTRIES* for Aug. 2, 1923. The method of preparing the fabric for coating is also the same. In fact, fabrics which require dyeing are at present dyed in the Newburgh plant and shipped to Fairfield, Conn., to receive the rubber coating.

Among the important ingredients employed in the coating material are:

Crude rubber, received in the form of smoked sheets direct from the rubber plantations.

Several grades of reclaimed rubber, also received in sheet form.

Rubber substitute,* known commercially as brown fac-tice. This substance has the same chemical formula as

rubber, but not the same physical properties.

Coal tar and paraffin wax used for softening.

Whiting, in the form of calcium carbonate.

Litharge (lead oxide) used as an inorganic activator to speed up the vulcanizing process.

Flowers of sulphur, also a vulcanizing agent.

Various pigments employed to give the coating material the desired color. Garnet shellac is also employed in making the water varnish applied to prevent tackiness of the rubber coating after its application.

Reclaimed rubber is employed because it imparts to the compound certain physical characteristics which are desirable. This rubber is inspected with particular care to insure a correct percentage of rubber. It is also tested for specific gravity, acetone, chloroform and alcoholic potash extracts, free sulphur and working quality.

The mineral rubber employed helps the compound to retain the embossing and gives other desirable physical characteristics.

THIS the third of a group of articles dealing with trimming materials widely used in automobile manufacture. Other articles of a similar nature are in course of preparation.

All of these articles should be of interest to engineers and executives, especially to purchasing agents of car and body building concerns, for the literature on this subject is quite limited and there is a consequent lack of dependable information intended to guide purchasers.

Comments or questions relating either to these articles or to other subjects in connection with body trim and finish will receive careful consideration.

*No true rubber substitute possessing all the properties of rubber has yet been produced. Synthetic rubber has been made by the gradual polymerization of several hydrocarbons. Such rubber oxidizes very readily and has physical properties comparable with those of the poorer grades of natural rubber.

Rubber substitute is the term applied to the materials resulting from the vulcanizing of certain vegetable oils, such as corn, rape and cottonseed oil, by treatment with sulfur chloride.

The mineral rubbers are not forms of rubber but bituminous materials which are natural products such as gilsonite or the crude tar residue from the distillation of petroleum.

All of the raw materials employed are carefully sampled and checked upon receipt to insure compliance with purchase specifications. Similar checks are made on the product during the process of manufacture to guard against mistakes in compounding and handling, as well as upon the finished product prior to shipment. This insures a product of uniform character, the serviceability of which it is possible to guarantee. Toledo scales are employed throughout the plant to insure careful weighing of the various ingredients employed.

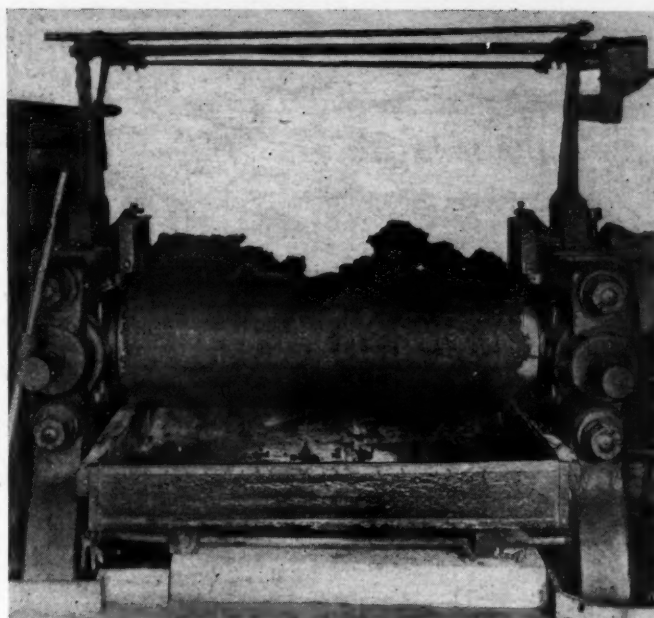
Chief among the pigments used is carbon black, a light fluffy carbon which, unless carefully handled, is certain to make the plant very dirty. To prevent this the carbon black is mixed with coal tar in a separate building devoted especially to this purpose, the resultant mixture being of a slightly sticky nature which effectually prevents the carbon black from flying around after it leaves the mixing room. The whitening employed is treated in similar fashion for much the same reason.

The first operation in preparing the rubber portion of the compound is to break down the crude rubber by working it repeatedly between a pair of smooth rollers, one of which turns slower and is heated to a slightly higher temperature than the other. The rubber collects in a sheet on the slower moving roll, is cut off by hand and again fed between the rolls. This softens the rubber and facilitates incorporation of the other ingredients.

How Coating Is Prepared

The rubber thus worked and softened is weighed out together with the desired proportion of reclaimed rubber and the two are then placed in a Banbury mixer together with a softener for five minutes. In this mixer the rubber ingredients are kneaded and thoroughly mixed for five minutes, after which the various compounding ingredients which are weighed out and placed in a hopper on the floor above the mixer are added through a chute, after which the mixing continues in the Banbury mixer for another five minutes.

The plastic mass is then discharged from the mixer and is again taken to a pair of rolls which reduce it to sheet form. At this stage the compound has all of its ingredients except the sulphur which is added later as noted below. After leaving these rolls in sheet form the rubber is taken to straining machines employing a worm (similar to those used in meat-choppers). In these strainers any hard particles of dirt or undeveloped particles are removed, and the compound issues like spaghetti about $\frac{3}{8}$ in. in diameter. The strained compound is taken to another set of rolls where it is slabbed out into sheets which are allowed to age for 24 to 48 hrs. in order to regain certain of their physical characteristics.



One of the break-down rolls used in preparing the rubber composition for application to the fabric. Rubber being fed between the pair of rolls is seen at the top and a coating on the nearer roll. This coating is cut off by the operator, using a knife, and again fed through the rolls several times to insure thorough mixing of the ingredients

Following the aging operation the compound is ready for the addition of sulphur which is mixed in carefully weighed proportion on still another set of rolls. Here the compound is worked through the rolls several times to insure uniform mixing of the sulphur. From these rolls the compound is taken to a "warm up" mill or another pair of heated rolls, where it is worked and warmed to the best temperature for feeding into the calender.

The calender employed consists essentially of four steel rollers about 22 in. in diameter by 5 or 6 ft. long, placed one above the other as shown in the accompanying diagrammatic sketch. All the rolls in this machine

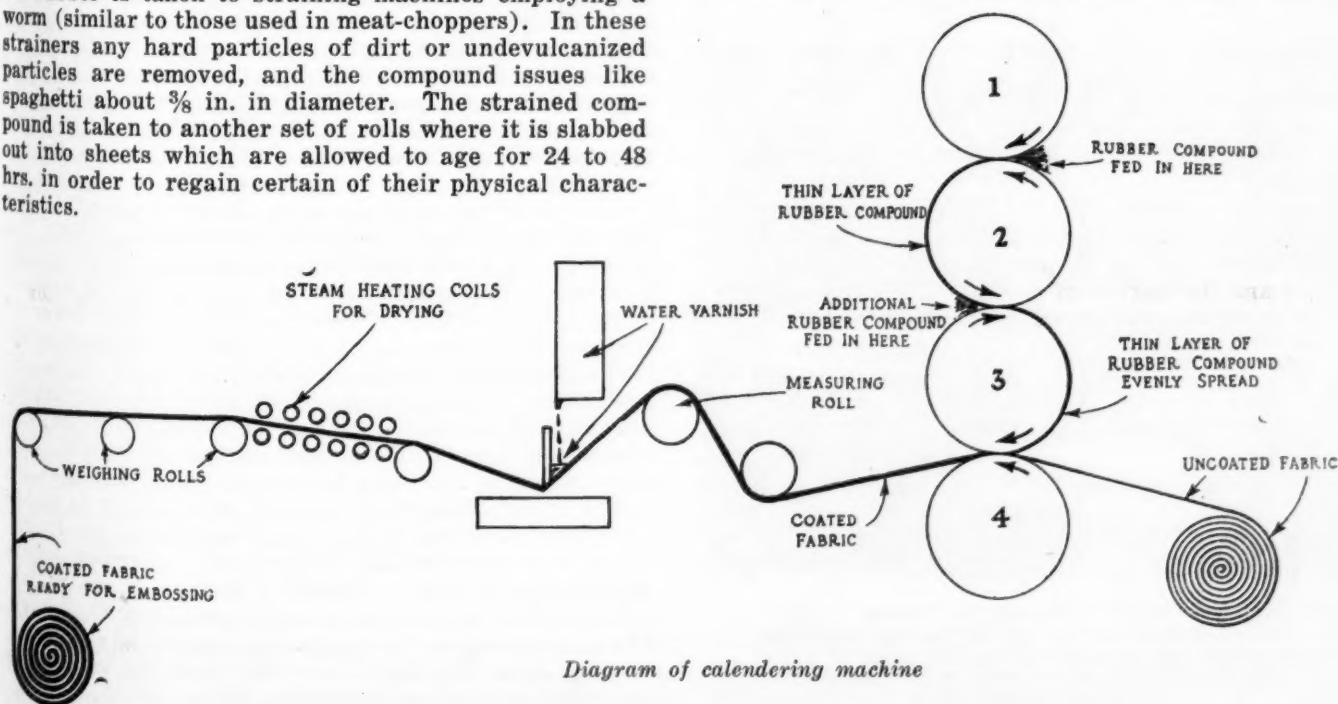
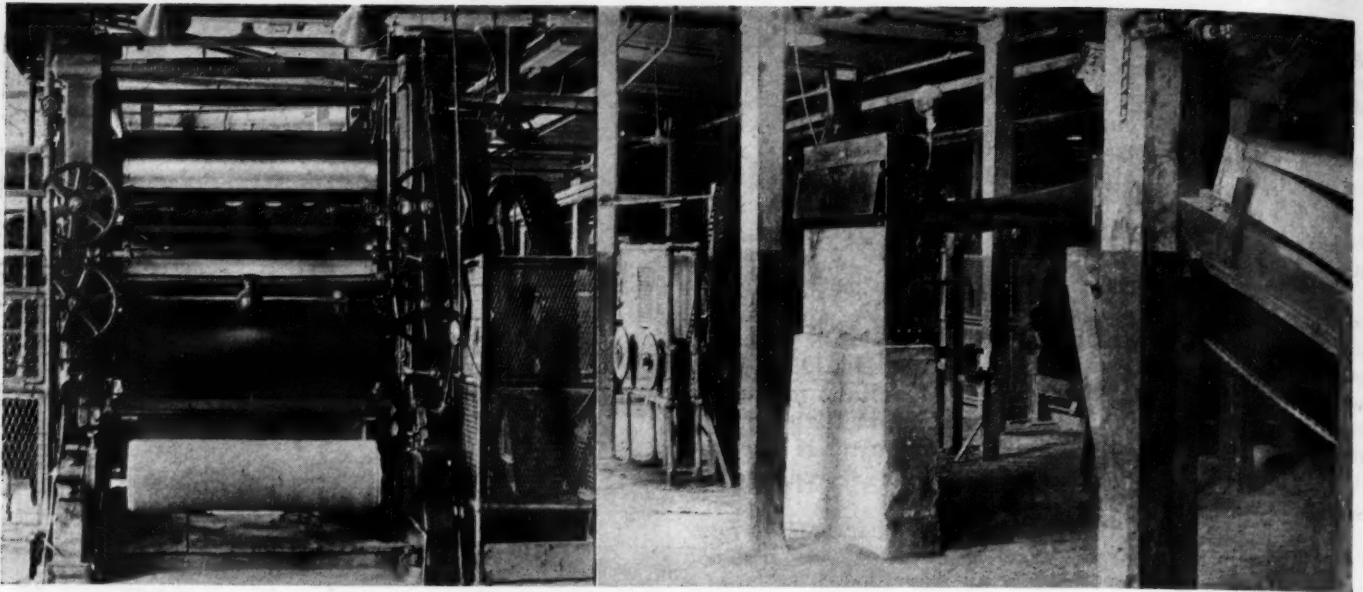
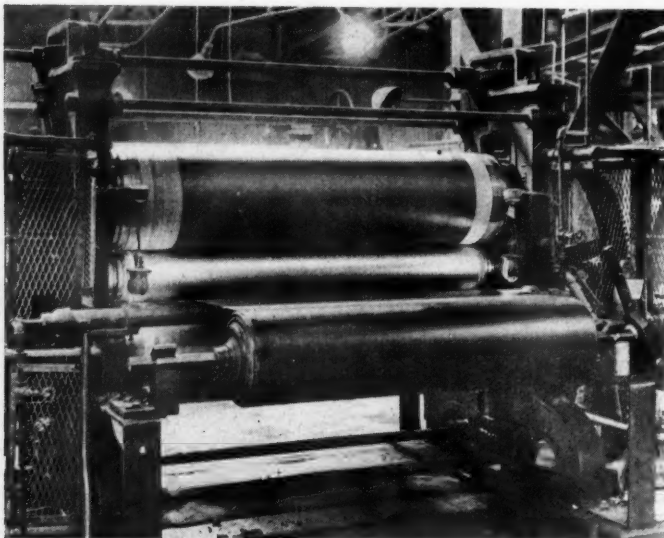


Diagram of calendering machine



Left—Front view of calender used for applying the coating to the fabric. The composition is seen being fed in between the two upper rolls. The third roll from top has a thin coating of composition spread over its surface. This coating adheres to the fabric as the latter reels off from the spool (seen in the foreground) and passes between the two lower rolls. Thickness of coating is controlled by close adjustment of distance between rolls. Right—Weighing apparatus back of calender is used to keep a close check on thickness and uniformity of coating as the fabric comes from the calender. If weight exceeds or falls below prescribed limits the lights on the column in the foreground indicate this fact to operators, who make the necessary adjustments to change weight of coating

are steam heated. The fabric to be coated is fed between the two lowermost rolls, Nos. 3 and 4, while the rubber compound is fed in between the upper pair of rolls, Nos. 1 and 2. The upper pair of rolls forms the rubber compound into a thin sheet which, as shown in the diagram, follows the lower roll of the upper pair and passes between the second and third rollers of the set. Here a smaller additional supply of the compound is added to insure a uniform distribution of the sheet rubber over the rolls. This sheet of rubber compound issues between rolls 2 and 3 and follows around the surface of roll No. 3 until it comes into contact with the fabric as the latter passes between rolls 3 and 4. In passing between these rolls the rubber is pressed into and caused to adhere to the fabric in an evenly distributed coat.



Machine used for embossing or forming grain in the rubberized surface of the leather substitute. Central roll is engraved to give desired grain. Other rolls are paper covered to provide yielding surface under fabric

The coated fabric then passes under a guide over a small clock roll which measures the goods and thence under a knife which, as shown in the diagram, forms a trough, which is kept partly filled with water varnish. In so doing the water varnish is spread evenly over the coated surface. The coated fabric then passes between heating coils which rapidly dry the water varnish, and over three weighing rolls, after which it is wound up in a large roll and is ready for graining.

Control of Thickness of Coating

The central one of the three weighing rolls is attached to a weighing machine or scales in such a way as to indicate the weight of 5 yd. of the goods which has just been coated. The scale on which this weighing is made is provided with electrical contacts which light either a red or a white light in case the weight of the fabric exceeds or falls below certain prearranged limits. By this simple means it is possible to keep a careful check upon the weight and consequently the thickness of the coating applied, and to adjust the rolls of the calender accordingly.

The roll of coated goods is next taken to the embossing machine where it is passed between a pair of rolls, the upper one of which is steel engraved with the grain substantially duplicating that of leather which the finished product is intended to closely resemble. The lower of the two rolls in this machine is covered with paper which forms the matrix for the embossing operation. After embossing the coated material is delivered to a varnishing machine, where it is passed under two small guide rolls and over a varnish roll between the two guide rolls. The varnish roll is arranged so that its under surface dips into a trough filled with varnish, which later is transferred from the roll to the coated surface of the fabric. From this machine the coated and varnished fabric passes directly into a vulcanizing oven in which the fabric is automatically hung in loops some 10 or 12 ft. high. The fabric remains in these ovens exposed to a temperature of about 250 deg. Fahr. for about 2½ hr., during which vulcanizing of the rubber takes place.

From the vulcanizing ovens the finished product is taken to inspecting machines, where it is carefully inspected and reeled off onto measured rolls ready for shipment.

Double texture fabrics made up from two pieces of material cemented back to back are frequently employed in automotive work. Such fabrics are best combined before coating and this process is accomplished by covering one side of each of the two materials to be placed back to back with rubber cement. The rubber cement is dissolved in gasoline and applied by the knife type of coating machine similar to that used in making pyroxylin coated fabrics. Each of the two pieces is given a coating and the two fabrics are then run through combining rolls which press the two cement covered surfaces together. When one of the fabrics thus combined is rather thin as in case of sheetings, some of the cement is forced through the thin material, thus helping to insure a better bond between this material and the rubberized coating which is later applied.

Pigments Mixed in Agitators

Whether the rubberized fabric is to be made in other colors or in black, the pigments used in the finishing coat are mixed in agitators with linseed oil varnish.

The testing laboratory, which is operated in conjunction with the manufacturing plant, is equipped with mixing rolls and small calendering machines in which the processes employed in the plant are conducted on a small scale in order to insure a satisfactory product once a run on a commercial scale is attempted. Compounds made up experimentally in this manner are rolled into sheets of standard thickness, cut into standard test pieces with a suitable die, and these pieces tested for tensile strength, elongation and set, both with and without aging.

Following completion of the manufacture of batches of coated fabrics suitable samples are taken from the rolls and subjected to standard tests for tensile strength, tearing strength, scrub, anchorage of coating, waterproof characteristics, and effect of artificial aging. The artificial aging tests enable the plotting of a curve from which it is possible, by comparison with natural aging tests, to approximately predict the comparative durability of the goods in service. Goods which do not meet certain standard specifications are sold as seconds without guarantee.

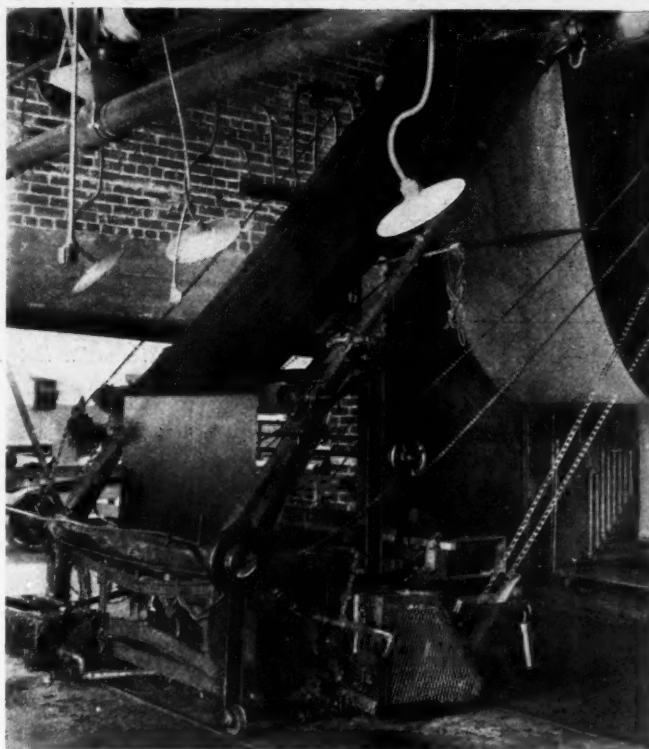
Rubberized Fabrikoid is furnished in three grades of lustre, of which the medium grade is said to be most serviceable for most automotive purposes.

In the marketing of rubberized Fabrikoid it has been found possible to save car manufacturers some expense by shipping goods intended for side curtains in 54-in. width instead of 36 in. The 54-in. material usually cuts to better advantage and saves handling.

Points Users Should Consider

Purchasers of rubberized Fabrikoid who have occasion to store or stack this material will find that it is kept in better condition by standing on end than when laid in horizontal piles. If laid horizontally the pile should not be more than four high, as this is apt to press out the embossing. It is recommended that users occasionally check the number of tops manufactured against the yardage of goods purchased in order to be sure that material is being used to best advantage. While some concerns make certain allowances for defects in material, this allowance does not cover time lost in sorting or possible partial application before the defect is discovered.

Although a few car manufacturers buy coated fabrics

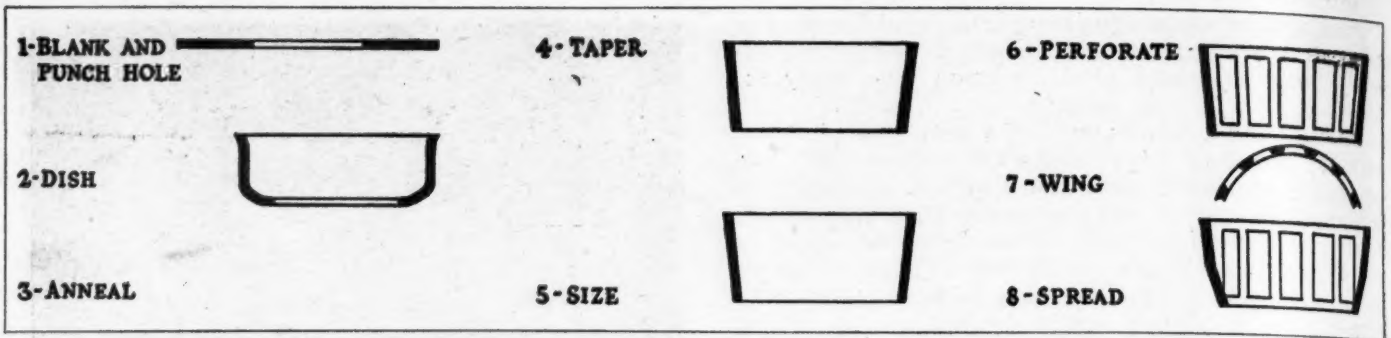


Varnishing machine which gives embossed surface of the material a gloss protective coating. On leaving this machine, which is mounted on a track in front of the battery of vulcanizing ovens, the Fabrikoid is automatically fed into the ovens and supported in folds during the vulcanizing operation

on logical well-drawn specifications, a majority are not familiar with such specifications and are therefore apt to have trouble with inferior materials which may have as good an original appearance as much more durable goods may have. On this account it is not expedient to buy simply on a price basis.

Although most rubberized fabrics employed in automobile top and curtain construction are furnished in black, there has been considerable demand for light khaki colors, especially for use on the tops of so-called "sport" models, and the Fairfield Plant of du Pont Co. as well as other manufacturers of a similar product have furnished more or less of this material. It has been found, however, according to du Pont chemists, that the pigments which it is necessary to use in producing these colors are inclined to accelerate oxidation and bring about rather rapid deterioration of the material. This is characterized by cracking and peeling of the varnish and sometimes of the coating itself. On this account the du Pont company had found it impossible to guarantee serviceability of fabrics with khaki colored coatings, although strenuous efforts are being made to find a varnish which will stand up on these fabrics and render them as durable as those with black coating.

A DEPUTATION from the British Science Guild recently waited upon the Parliament Secretary for Overseas Trade and strongly urged that the necessary steps be taken by the Government to give effect to the provisional scheme for an Empire patent drawn up at the British Empire Patent Conference at London in June of last year. This scheme provides that a patent issued anywhere in the British Empire shall extend to the United Kingdom, to any of the self-governing dominions or to India, upon registration in the particular territory in which protection is desired.



1—Chart showing the sequence of operations in the manufacture of the Timken tapered roller bearing cage

Rearrangement of Machines Brings Reduction in Bearing Production Costs

Cage presses are placed closed together. Handling is cut to a minimum. Nine operations in manufacturing process. Little hand work is involved. Annealing is done in rotary retort furnace.

BY placing power presses closely together in carefully arranged groups, so that handling of work between operations is reduced to a minimum, a saving of 25 per cent has been effected in the manufacture of cages for Timken tapered roller bearings at the Columbus plant. These machines formerly were set up at some distance from one another. The new arrangement permits the group of presses to operate almost as a single automatic unit.

The sequence of operations in the manufacture of the Timken cage are as follows:

- | | |
|-------------------------|--------------|
| 1—Blank and punch hole. | 5—Size. |
| 2—Dish. | 6—Perforate. |
| 3—Anneal. | 7—Wing. |
| 4—Taper. | 8—Spread. |
| | 9—Sandblast. |

The machines used for the first two operations are performed on Consolidated presses, No. 6, with an approximate output of 2300 per hour, being used for blanking and punching, and a No. 5½, with an output of 2900 per hour, for dishing.

Annealing is done in a rotary retort furnace, while tapering, sizing, perforating and spreading are accomplished in Consolidated presses having an average capacity of from 400 to 500 pieces per hour. Spreading is done with a No. 2-A Bliss press, the capacity of which is 2000 per hour.

The cage presses are grouped in a unit to take care of the first five operations. These operations perform the work shown on the operation chart, Fig. 1.

In the first operation a roll feed automatically carries the cage stock through the blanking press, where the disk is punched from the strip and the slug is punched from the disk. The washer then slides down a chute and on to a conveyor, which elevates it to a hopper located at the right hand of the man feeding the dishing operation. The blanking press is shown in Fig. 2.

The second or dishing operation is fed by hand and the dished cage is kicked off automatically, falling down a chute on to a conveyor, which elevates it and drops it into the retort of the annealing furnaces (Fig. 3).

The retort in the annealing furnace is spiralled and run at such a speed that the cage is properly annealed by the time it reaches the end, at which point it drops into a bath of oil and water. It is then picked up by another conveyor and elevated to a hopper feeding the taper operation.

The cage is ejected automatically from the taper operation and is then conveyed in a similar manner to the hopper for the sizing operation. Following the sizing operation, the cages go by means of a chute into a hopper truck. These trucks when full are placed ahead of the perforating presses. The perforating and winging presses, being readily convertible from the handling of one part to another, are not placed in units but in separate groups. The cages are handled from the hopper trucks to a special cage tote pan of about 18 by 24 in. in plan and 8 in. in depth.

The cages are perforated by means of a semi-automatic fixture, all perforations at one time, and are then put into another tote pan and taken to the wingers, where winging operations are performed.

The spreading operation also is fed by hand. Following this, the cages are put into a hopper truck and are taken to the sandblast department. After sandblasting they are sent to the cage inspection department.

The delays avoided by the unit or group system of arranging the machines are naturally in the handling between operations. The automatic conveying of the cages from one operation to the next and the close spacing of the machines permit one operator to do the work formerly requiring two or three. The actual dies and the machines themselves are identical with those employed in an individual layout. By carrying them together in groups, however, the single machine effect is secured.

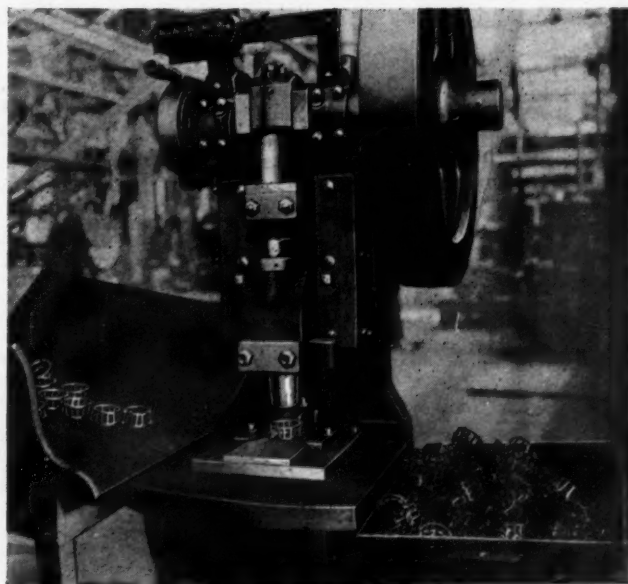
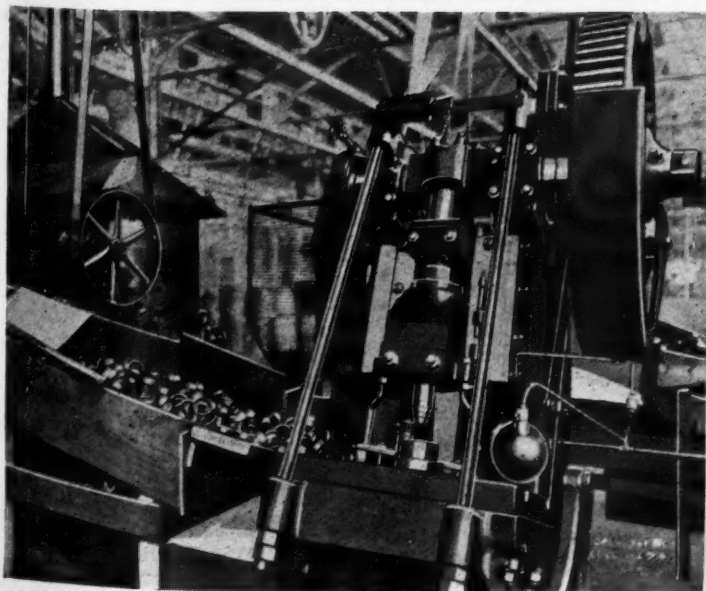
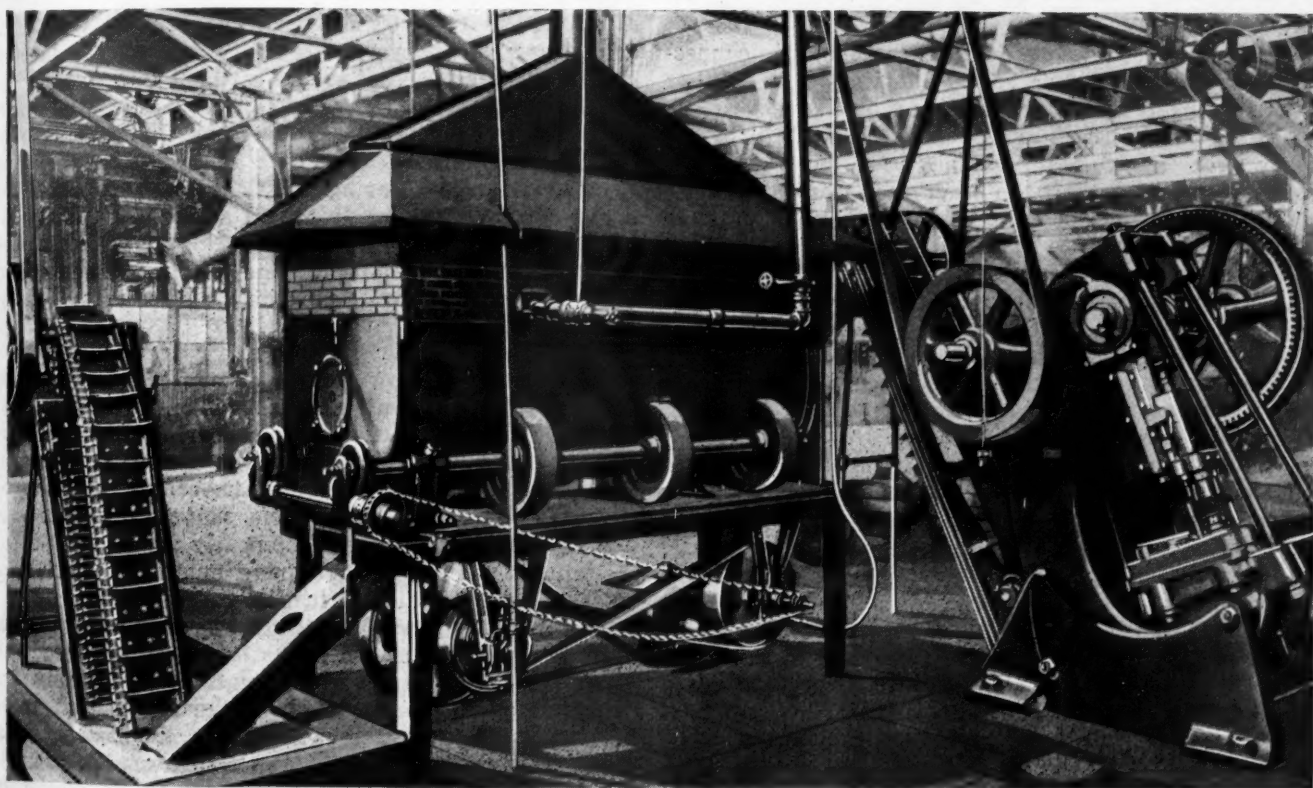
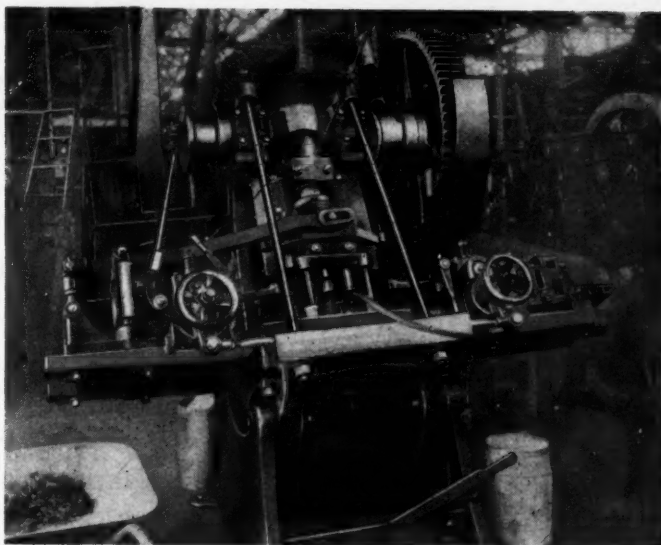
This system is interesting from the standpoint of the expeditious handling of small parts between operations. The fact that bearing cages require precision work and are inspected to close limits does not affect the ability to use this method of manufacture. The system is applicable to practically any type of punch press work where a sequence of four or five operations is required.

2—Blanking and punching hole on No. 6 consolidated press at rate of 2300 per hr. The cage stock is fed to this machine from a roll feed

3—Layout for conveying the cages from the dishing operation to the annealing furnace and into the conveyor which leads from the oil and water bath to the tapering machine

4—Tapering the Timken tapered roller bearing cages on a No. 6 consolidated press at rate of 2300 per hr. and passing them through conveyor to sizing machine

5—Spreading operation on the cage which is fed by hand. This is a No. 23 consolidated press capable of handling 3600 pieces per hr. Following this operation, the cages are sandblasted



Opinions Vary Regarding Usefulness of Oil Grooves

Part III

Hydrodynamic theory applied to friction bearings shows that the greater the unbroken film of lubricant the greater the load the bearing will sustain. No account is taken, however, of the fact that the temperature of the oil increases considerably.

By P. M. Heldt

At the present time one of the moot points in connection with automobile engine lubrication is whether there is any advantage in the use of oil grooves and, if so, what form these grooves should have. Up to the present, grooves have been generally used, most engineers considering them necessary in order to properly distribute the oil over the whole bearing surface. Lasche refers to the subject especially in connection with bearings with ring oilers, but does not appear to have made any experiments with grooveless bearings. Where ring oilers are used, he says, a recess must be provided at that part of the bearing where the ring delivers the most oil. From this recess grooves should extend helically toward both ends of the bearings, but not all the way to the ends. The edges of these grooves must be nicely beveled, so that they will not scrape the oil off the journal. The grooves should be supplemented by others extending helically in the opposite direction, so as to carry the oil back toward the center, grooves of opposite helix not intersecting. This, he says, has the effect of distributing the oil uniformly over the whole of the bearing surface and of retaining it in the bearing a sufficient length of time to enable it to take up a considerable amount of heat.

In 1910 a paper on Forced Lubrication was read before the Institution of Automobile Engineers by R. K. Morcom, in which the use of pressure feed to the bearings of automobile engines was advocated. Morcom was a member of the firm which built the first high speed steam engines in England, and in this connection had had much experience

with the system. As regards grooving, he recommended a single circumferential groove at the middle of the length of the bearing, the halves of the groove being staggered or offset sufficiently lengthwise so that no ridge would wear on the journal. (Fig. 1.) For extra long bearings, such as the main bearing at the flywheel end, he recommended a longitudinal groove in addition, an illustration accompanying the paper showing this to be located near the bottom of the bearing. The offset or stagger in the circumferential groove occurs at the sides of the bearing.

Theoretical Objection Proved

The theoretical objection to circumferential grooves is easily proved. It was shown by Tower that, taking a longitudinal section through the bearing, the pressure of the oil film is at a maximum at the center of the bearing. Now, if there is a groove at the center, extending all around the bearing, it is obvious that the pressure at the middle of the length must drop nearly to zero and the total sustaining power of the bearing must be materially reduced. This is indicated in Fig. 2.

In this country crankshaft main bearings are made that have grooves only at the joints between bearing and cap, extending not quite the whole length of the bearing, from which extend a number of short, tapering outlet grooves, uniformly spaced over the length of the bearing. This arrangement gives an unbroken length of film extending nearly half way around the circumference of the journal, while at the same time proper distribution over the whole

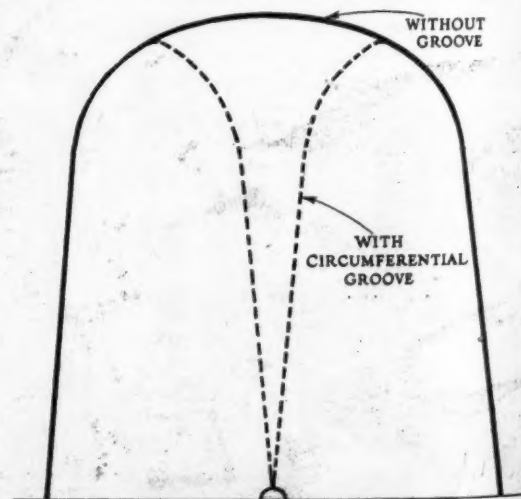
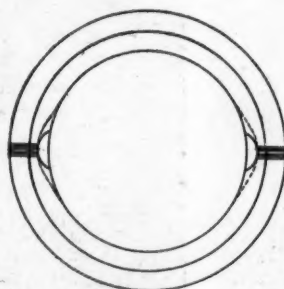
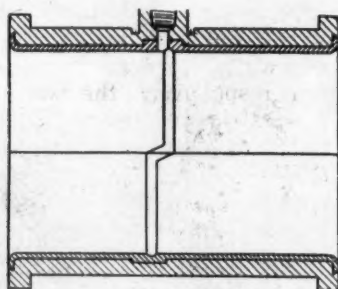


Fig. 1—Bearing with staggered circumferential oil groove.
Fig. 2 (on right)—Distribution of pressure on oil film with and without central circumferential oil groove.
Fig. 3 (center)—Grooveless bearing

bearing surface would seem to be assured. (Fig. 3.)

The Reynolds theory of lubrication, based on hydrodynamic principles, leads to the conclusion that best results should be obtained from grooveless bearings. With all methods of feed other than pressure, the pressure in the film at the points of entrance and exit of the oil is nil, and the maximum pressure which can be sustained by the film increases with the length of the unbroken film in the direction of motion. Grooves in the bearing cause a break in the film, and therefore should cause a reduction in its sustaining power.

Premises Attacked

This question has been discussed recently by W. Kucharski in the *Zeitschrift für das gesamte Turbinenwesen* and in *Dingler's Polytechnisches Journal*. Kucharski admits the soundness of Reynolds' reasoning and says that if one wants to criticise his results it is necessary to attack his premises. One of these is the assumption of a constant oil temperature. Now, it is well known that the oil in passing through the bearing increases considerably in temperature from the point of entrance to that of exit, and that in consequence its viscosity decreases materially. With a great uninterrupted length of the film in the direction of motion it is theoretically possible for high fluid pressures to develop, but the mean temperature of the oil increases at the same time, the viscosity of the oil decreases and the film becomes thinner. On the other hand, with a short length of film the temperature rise becomes smaller but the development of high pressure in the film is impossible, and the film again remains thin. Kucharski reasons that between these two extremes there must be a length of uninterrupted film (relative to the axial length) which insures the maximum thickness of film and, hence, the maximum sustaining power. He shows mathematically that with a bearing surface having a circumferential length equal to 1.2 times its width the temperature rise is 50 per cent greater than if the ratio of length to width is only 0.7. He arrives at the following conclusions:

1. The temperature rise in the oil film is the less the smaller the ratio of the bearing surface length in the direction of motion to the width, measured perpendicular thereto. A division of the width, that is, the provision of circumferential grooves in cylindrical bearings, is inadvisable.

2. With a view to insuring the formation of a film of lubricant of maximum thickness, the uninterrupted length of bearing surface in the direction of motion should be made the less the higher the specific load and the lower the oil temperature, that is, the greater the viscosity of the oil. Best results should be obtained with a bearing surface of approximately square form.

3. The maximum thickness of film as a function of the length-width ratio is not very sharply defined; this allows sufficient latitude to take care of the factors not taken into account in the analysis, such as sufficient lubrication when starting under load and in case of reversal of motion. In the case of cylindrical bearings the direction of the load must in all cases be considered.

Function of Grooves

Another theory in regard to oil grooves is that they are required mainly to provide a place in which metal particles worn off from the bearings may lodge. If by this is meant that the particles when they are first torn away from the bearing are to be caught in the groove, then a groove parallel to the axis of the bearing would evidently be the correct thing. Also, as a sediment pocket for metallic particles the groove would evidently be most effective if

located at the bottom of the bearing. Once the fine metal particles have left the bearing, the best way of dealing with them is, of course, to strain them out by means of a large, fine-mesh strainer so that they will settle at the bottom of the oil well and not be carried back to the bearings with the oil.

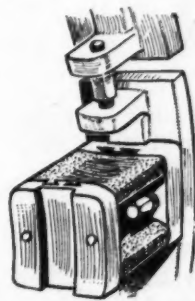
The subject of grooving is referred to in the report of the Lubrication Research Committee recently prepared by Dr. Stanton. In the summary of this report, which deals with the results of tests made with a special pendulum type of oil testing machine, it is stated that "the vexed question of grooves in bearings, which has given rise to so much controversy in the past, may now, it is thought, be regarded as settled. It was found by Beauchamp Tower that the presence of an oil groove in the crown of the bearing of a uniformly rotating shaft effectively prevented the formation of an oil film. It has now been demonstrated that in reciprocating motion a liberal amount of grooving to give the oil access to all parts of the bearing surface is desirable for efficient boundary lubrication."

Dr. Stanton's conclusion, it will be seen, relates to the advantage of grooves in reciprocating bearings only, and the only bearing in an automobile engine that has anything like the motion maintained in the bearing of the experimental machine is the piston pin bearing. Still in the latter the load reverses, while in Stanton's machine it does not.

The writer would not consider the fact that the very extensive grooving used in this instance resulted in a reduction of the friction, conclusive proof that grooving is necessary or advantageous. That the friction would be reduced by cutting away a large amount of the bearing surface would have been expected from the results of previous investigations. In fact, Lasche points out that the smaller the bearing the less the friction loss, within the limits of specific load which the oil film is capable of sustaining. What should have been done in this case, to prove the validity of the conclusion drawn with respect to grooves, is to reduce the diameter and length of the ungrooved bearing relative to the grooved one and see whether just as low a friction coefficient could not be obtained in that way.

Dunlop Experimenting With Rubber Spoked Wheels

THE British Dunlop Company has devised a system of wheel construction in which flexibility is secured by the use of rubber spokes. The design is intended primarily for trucks with solid rubber tires and embodies short spokes of H-section dovetailed into and vulcanized on end plates of steel. These units at each end are bolted to the hub and a contractible rim respectively, the rim having sections equal in number to the spokes. The rim can be contracted, compressing the rubber spokes, for mounting the tire with its felloe band and then expanded into the latter by means of right and left hand threaded screws that couple the segments of the rim. The accompanying sketch shows one section of the rim with a spoke attached and one of the adjusting screws of the rim.



Section of experimental Dunlop wheel with rubber spokes

This design is not yet on the market, but it is understood to be still in the experimental stage with various renderings of the principle involved now undergoing tests.



The FORUM



Road and Brake Surface Principles Discussed

Westinghouse engineer tells reasons for fact that brakes are more effective just before wheels are locked than afterwards.

Editor, AUTOMOTIVE INDUSTRIES:

"Proper Study of Weight Distribution Essential to Correct Brake Design," by P. M. Heldt in AUTOMOTIVE INDUSTRIES of Aug. 9, is indeed most timely and without doubt the clearest and most concise exposition of the fundamental theory of automotive braking which has yet been published. The succeeding articles of this series will be looked forward to with much interest, and many of our automotive engineers can profit from a thorough study of the principles which are involved in braking. The time has come when the retardation curve stands equal in importance with the acceleration curve.

Mr. Heldt mentions that the brakes are more effective just before the wheels become locked than after they are actually locked, and probably many of your readers have heard this statement at different times without stopping to analyze the reason for this condition or its practical application.

Friction may be defined as the resistance of two bodies in contact offered by one to the other to oppose a change in relative position of the two bodies. This resistance is offered along the surface in contact, and is directly opposed to the force along these surfaces producing, or tending to produce, the relative motion. When this force is not great enough to overcome the friction, and, as a result, no motion takes place, we refer to the friction as "Static Friction" or "Friction of Rest." But when the force is greater than the resistance of friction, and one of the bodies slides over the other, we call the friction "Kinetic Friction" or "Friction of Motion."

Every surface, no matter how highly polished it may be, has mounds and depressions on it. The theory of friction is that these humps and hollows on two surfaces in contact tend to interlock or mesh like two gears. The smaller the humps and hollows are, which is another way of saying the smoother the surfaces are, the less the friction will be and the less the force necessary to cause one body to slide over the other. To return to the illustration of two gears: The smaller the gear teeth are, the less one gear must move away from the other in order to ride over the teeth, and also the easier it is to strip off the teeth.

Static friction, or friction of rest, is always greater than kinetic friction, or friction of motion, because, while at rest, these humps and hollows have the very best opportunity possible to become thoroughly interlocked. When one surface is sliding over the other, these humps have not time to drop in and fit the corresponding hollows in the other—but each surface has the "jump" on the other and "hits only the high spots." As the velocity of one

surface, with respect to the other, increases, the more this is true. That is, *the friction becomes less as the velocity increases.* This is illustrated by pushing a brick across a table top—considerably more "push" is required to start the movement than to keep it up after it has been started.

Rolling friction is static friction, for the point of the tire tread in contact with the road does not move or slide relative to the road. Another way of expressing this is to say that during a revolution of the wheel, each point around the tread comes in contact with but one point on the road, and, using the automobile as a reference point, the road is moving backward at the same rate as the tangential velocity of the tire. For simplicity, this static friction between the road and the wheel is given the name "Adhesion."

A wheel will roll easily in the direction in which it is pointed, and will resist sidewise movement, but if locked it will *slide* in one direction as easily as in another. This is the reason a skidding automobile will turn sideways so easily upon the application of any force not exactly in line with its path of travel. Likewise, in ascending a grade on a slippery street the coefficient of adhesion limits the accelerating force which may be applied. As long as we proceed slowly everything is lovely, but any attempt to "pick up" may mean that the accelerating force has exceeded the limit of adhesion—the wheels spin and the factor of adhesion drops to that of sliding rubber on a wet street. The only solution is to stop entirely and start again very slowly with a uniform, gradual acceleration. It sometimes happens that after driving part way up a hill the car will slide back to the foot with its wheels still spinning in a forward direction. Driving with the brakes partially set is another expedient. When the wheels strike any specially slippery spots, the brakes hold the load on the engine and prevent it from jumping ahead and spinning the wheels on the slippery spot.

The car with perfectly equalized brakes can be stopped in a considerably shorter distance than the car on which one rear wheel is locked and the other rolling, and, similarly, the car whose wheels can be held almost at the point of locking throughout the entire stop will stop in a much shorter distance than the car whose wheels are locked throughout the stop. It may be said, however, that most present-day braking systems are inadequate to take full advantage of maximum road adhesion and produce the shortest possible stop. The coefficient of friction between the brake linings and drums at a speed of five miles per hour is in many cases twice its value at forty miles per hour (and this is not considering any "wrapping" action

of the brake), which means that a definite force exerted on the pedal will produce at forty miles per hour only one-half the retarding effect this same force will produce at five miles per hour.

The principles of friction which must be considered in automotive brake design, governing both tire and road contact, and brake band and drum contact, may be briefly summarized as follows:

- (1) Rolling friction is static friction, or adhesion.
- (2) Static friction is always greater than kinetic friction for the same materials.
- (3) Friction decreases as velocity is increased; or, in other words, the coefficient of unlubricated friction has a maximum value when the speed is zero, from which value it declines, rapidly at first and thereafter more slowly, for continually increased speed, but the coefficient of friction can never be zero for any finite speed.
- (4) The coefficient of friction decreases at a variable rate with increasing pressures.
- (5) Up to a certain critical point, the coefficient of friction increases as the temperature is increased. Above this point, further increases in temperature cause a decrease in the coefficient of friction.
- (6) The coefficient of friction gradually decreases as time of rubbing of the surfaces in contact is prolonged.

H. D. HUKILL, Automotive Division,
Westinghouse Air Brake Co.

Lubrication Theories Questioned

Editor, AUTOMOTIVE INDUSTRIES:

An editorial headed "Lubrication of Racing Engines," which appeared in your July 19 issue, directs attention to a prolific source of trouble that is by no means confined to racing engines, to wit, burned bearings. The original editorial, together with a communication referring to it which appeared in your issue of Aug. 16, would lead the reader to the conclusion that bearing failures of the kind referred to were due to some deficiency of the lubricating system which permitted the bearings to attain temperatures which were responsible for the damage or, conversely, that the trouble was due, primarily, to bearing temperature, and that the high temperature resulted from some deficiency of the lubricating system.

In the face of the fact that any bearing, no matter how well lubricated, is a heat-generating element, is it not misleading to chalk the failures against the lubricant or the lubricating system. Any bearing, and particularly one of the plain type, where the shaft is in contact with and moves relatively to the bearing surface, offers some resistance to the motion of the shaft, and the thermal equivalent to the power expended in overcoming this resistance appears at the rubbing surfaces in the form of heat. The answer to the problem would appear to lie (1) in so arranging the bearing that it will offer the least frictional resistance, and (2) in providing a heat exit to maintain the temperature of the bearing within proper limits.

The suggestion made in the editorial, to provide a voluminous oil feed, may in some cases assist in keeping down the frictional resistance, particularly if the bearing is hot, because it is difficult indeed to wet a hot bearing surface. The root and branch of the lubrication problem consist in moistening or wetting the rubbing surfaces. But there are limits to the rate of oil feed beyond which it is impracticable to go, and, besides, if a large amount of oil is fed, an equal quantity must come out of the bearing, which in racing and other engines gives rise to carbon deposits and their manifold manifestations, such as plug and valve fouling, pre-ignition and the like.

If, as was stated in the two articles referred to, the bearing failure was due to too high temperature, the bearing should be made with a cooling element that would provide an exit for the frictional heat generated at the bearing surface proper, and, further, the bearing should be heat-insulated against the conduction of heat from the pistons by way of the piston pins and connecting rods. The cooling effect of a large volume of oil is a very doubtful factor, and it has been the writer's observation that a lubricated bearing once heated does not respond favorably to a further application of any quantity of oil, which is a poor cooling agent at best.

As a staunch supporter of and participant in racing, the writer greatly values the lessons of the track and the speedway, but the builders of racing equipment would do well to take note of the means employed by commercial engine builders, who guard against hot bearings by building them to run cool.

JAMES B. WATSON,

Vice-President, Bearing Engineering Syndicate.

The suggestion made by Mr. Watson, to provide the bearings with means for quickly getting rid of the heat generated in them, is a good one, and we know of at least one builder of racing engines who turns his connecting rod heads with flanges for this purpose. We very much doubt, however, the expediency of heat-insulating the crankpin bearings from the connecting rods to prevent heat from the pistons reaching them. The piston head, when the engine is being run steadily at nearly full load, is undoubtedly quite a little hotter than it is advisable the engine bearings should get, but to reach the bearings the heat has to flow through the piston walls and bosses, the piston pin, pin bearing and the whole length of the connecting rod, and this path includes one lubricated bearing and one unlubricated joint. Without proof to the contrary, we feel quite sure that the temperature gradient along this path is much greater than the minimum difference in temperature which it is desirable to maintain between the piston head and the crankpin bearing, and that in all normal operation there is a flow of heat from the crankpin bearing into the connecting rod rather than in the other direction. In other words, a good heat-conducting joint between the crankpin bearing and the connecting rod would help to keep down the temperature of the crankpin bearing, instead of raising it.

If our correspondent has proof to the contrary we should like to receive it.

Mr. Watson's reference to bearing surfaces as rubbing surfaces is not in conformity with the generally accepted theory of lubrication, according to which the metallic surfaces of a properly lubricated bearing never come in contact with each other. These surfaces are always separated by a film of lubricant and the relative motion takes place by one layer of the lubricant sliding over another layer. There is no relative motion between the particles of lubricant next to the metal and the metal itself, and the opposite metallic surfaces are not even in contact. This is also proved by the fact that it is impossible to properly ground an electric circuit through a well-lubricated plain bearing.—Editor.

IN the Department of Aerodynamics of the National Physical Laboratory in Teddington, England, experiments are at present being carried on in a large duplex wind tunnel on a one-fifth full size model airplane, whose propeller is being rotated by a 1½-hp. electric motor, to investigate the effect of the slipstream on the behavior of the machine. The department is also conducting experiments on the stresses in the hull of airships due to turning and on the air flow in the vicinity of a propeller.

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Spring Dating Policies Modified

THE Rubber Association of America is to be congratulated for having gone on record, through its executive committee, as favoring a modification of current practices as regards spring dating. The policy of selling dealers large stocks of tires in the fall without requiring payment until four to six months later has been common in the tire industry for many years. A good many executives feel that it should be discontinued altogether, but that their companies cannot afford to take an arbitrary stand unless supported by all of the strong companies.

The five recommendations made by the Rubber Association executive committee do not aim to eliminate spring dating, but merely to minimize some of the chief difficulties which it has engendered. The committee recommends confining spring dating orders to one per customer to avoid overloading dealers with stocks greater than they can sell. Tire makers are urged, also, to try to sell to city dealers on short terms, because sales in urban areas are believed to be affected very little by seasonal considerations. Both of these recommendations, if carried out to any con-

siderable extent, will be definite steps in the right direction.

Recognition of the fact that seasonal changes are not major factors in influencing tire sales in cities indicates marked progress in analyzing tire marketing problems. Further study is likely to show that general business and economic factors have so much greater influence on tire sales than do variations in weather that the latter are relatively unimportant.

Spring dating has been continued because many companies have believed it necessary to stabilize the manufacturing schedule, but careful study of the production curve for the last three years shows that economic conditions, not seasonal changes, have caused practically every fluctuation of importance. Dealers no longer demand spring datings. Many of them, in fact, are strongly opposed to the practice, so that it need not be continued on their account.

The action of the Rubber Association executive committee should have a highly favorable reaction among leaders of the tire industry and should serve, not only to minimize some of the present merchandising difficulties, but also to concentrate further attention on the whole question of spring dating.

Mr. Babson Sounds a Clarion Call

ROGER BABSON has painted a horrific picture of what the automobile is going to do to the United States unless it is throttled. Here are just a few of the dire disasters he sees by gazing into the crystal ball:

By buying automobiles millions are debarring themselves from ever becoming home owners.

This means a decline in the American birth rate.

The automobile is developing new diseases and a change in diet will be necessary.

Less money will be spent on clothing and a different type of clothing will be in demand.

Depreciation on even the cheapest cars amounts to 36 cents a day, idle or running.

When we read these assertions they "created a painful impression" as the diplomats say. We didn't know it was as bad as that. The manufacture and sale of automobiles, especially upon installments, probably should be stopped for the good of the nation.

Why not a constitutional amendment or at least a Congressional inhibition?

Mr. Babson is our most interesting economist. The trouble with most of them is that they stick to statistics and their conclusions make dry reading but Mr. Babson is never dry. His conclusions often are startling.

For example, after advising his clients not to be disturbed by the decline in stock market prices he changed his mind and told 'em they'd better sell on the "bulges." That was after the bottom had dropped out of the market and the "bulges" could be seen only with high powered telescopes.

His conclusions don't always seem logical. For example, in this particular speech, which was delivered before the Advertising Section of the Chicago Chamber of Commerce, he said:

"At present the automobile is greatly helping the building industry because of the millions of people moving from the cities to the suburbs and country. After, however, this exodus has been completed, the building industry will fall flat. Why? Because instead of a young married couple saving for a little home they save for a car, or rather they buy a car on credit."

Then he bewails a declining birth rate. We had always supposed that "the suburbs and country" were better places to raise children than congested cities.

If Mr. Babson has reliable statistics showing that the purchase of homes has declined sharply as the purchase of automobiles, on time or any other way, has increased, he would confer a distinct favor by letting us have them. We're distinctly from Missouri on this point and we'll have to be shown.

There was at least one other interesting point in Babson's speech. It was that "more money has been spent on automobiles in the last three and one-half years than has been spent in building homes within the last 150 years."

A clarion call to the proletariat has been sounded. If it is not heeded the fault will not be Mr. Babson's.

Meanwhile, the automotive industry will continue placidly the even tenor of its way.

Headlamp Adjustment

STATE legislatures recently have been talking a lot about automobile headlamps, along with numerous other automotive items. Proposals of various kinds have been made concerning regulation, while nearly every State already has on its statute books certain definite rules and lists of approved lamps.

Multiplication of laws is not likely to benefit either car users or automotive manufacturers, since legislation is often passed without full knowledge of the practical and technical problems involved in its application. So long as a large number of automobile headlamps are out of adjustment, however, demand for further legislation will continue. The quickest and only permanent method of avoiding adverse regulations always is to remedy the evil which generates the demand for them.

Automotive manufacturers can play an important part in the efforts which are under way to get car owners to keep their headlamps in proper adjustment. A big step forward would be taken if headlamps were in proper adjustment on every new car put into the hands of a driver. This is far from being the case today. In two ways, manufacturers can help achieve this desirable end:

1. By preparing simple and complete headlamp adjustment instruction charts and putting them into the hands of every dealer in their organization.
2. By urging dealers to use every means possible to see that headlamps are adjusted properly when the car is sold and that they remain in adjustment, at least through the ninety-day guarantee period.

The car owner who starts out with good lights is not very likely to be contented with poor ones in later

months. He knows what a good light is and he will get his lamps adjusted when he finds that they are not giving him as good illumination as they once did. Proper adjustment of headlamps on new cars, therefore, would constitute an important step toward eliminating the possibility of complex headlamp legislation.

Keeping Ideas in Balance

WHEN a new feature of design or a new commercial practice comes into an industry, the function of the business paper is to discuss it frankly and fully from every angle. Through the medium of the business press, men throughout the industry are given an opportunity to read and study opinions and ideas both favorable and unfavorable to the innovation.

Constructive comments of this kind are presented in descriptive articles, in editorials, and in critical summaries, new phases of the subject being treated from time to time. To tell the entire story at once would be impossible, because fresh viewpoints are being developed continually. Consequently, the position of a business paper on any particular topic may be misrepresented quite readily by quoting from its pages a few selected statements from a particular article.

It is this possibility which makes difficult that frank discussion of current problems so necessary to maximum industrial progress. The possibility of having a part of his remarks separated from their context and quoted to prove a point foreign to the original article must always loom up in the writer's mind.

Despite this fact, the business paper continues to fulfill its function of presenting facts, where facts are available, and intelligent opinions, designed to weigh in an impartial manner both sides of any question on which the industry is divided. To this means of seeking for truth its efforts are dedicated.

Labor Turnover Is Expensive

THE changing swing of the production curve brings forward again the problem of keeping factory organizations intact. A stable working force always is desirable, but different economic conditions make variations necessary from time to time. It does not follow, however, that the number of men let out should be in proportion to the decrease in manufacturing schedule.

A definite cost in dollars and cents must be paid for every worker discharged, as well as an additional expense for re-employment at some future time. Moreover, hiring and firing affects the morale of workers to a considerable extent. The man who is given steady employment through a period of relatively low production is likely to develop a loyalty to and confidence in his employer which will be reflected directly in more efficient workmanship.

Labor turnover is expensive, whether caused by dissatisfaction on the part of employees or by reason of business fluctuations.

Sales Keeping Above Marks of Last Year

Business Reported Well Ahead of October of 1922—Decline in Output Expected

NEW YORK, Oct. 15—Although sales of automobiles have fallen off in many sections of the country, with a consequent reduction in manufacturing schedules, there is no question but that business is far better than it was a year ago at this time. The drop in sales is by no means exceptional to the period and is not severe enough to cause any concern.

Reports from sales centers indicate that the volume of business is up to expectations, though not carrying along on previously established high levels. Buying is following much along the same conservative line that is governing output.

If manufacturing operations follow the curve of last year there will be a tapering off from now until the beginning of the year, when a quickening will take place. This latter condition is certain, due to the stimulus given by the New York show to be held in January. January of this year saw the start of expanded operations that continued through the nine months, established new monthly output records and brought total production of cars and trucks for the three quarters past the 3,000,000 mark.

Steel producers are reflecting the normal slowing down in automotive production, reporting a slight shading in orders and little difficulty in making deliveries. Parts bookings are being maintained at a satisfactory level, pointing to steady and, in instances, capacity operations.

Car Deliveries Prompt

Deliveries of finished cars are being made with greater promptness. Dealers in Detroit, the center of the industry, are now able to promise immediate deliveries, whereas heretofore orders have been taken on a thirty to sixty day basis. This is true in most parts of the country, although some reports are received of tardiness in the receipt of closed models which has acted as a sales resistant. This, however, is merely a temporary condition.

In the tire branch of the industry, activity is not so pronounced as it has been, although August figures from the larger makers show a movement forward in production and shipments as compared with July, and a

Business in Brief

NEW YORK, Oct. 17.—Although irregularities continue in the distributive trade, industry shows more evidence of spottiness. Reports show pig iron is lower but on the other hand steel prices are being maintained, with September production only 3 per cent below August, pig iron dropping more than 6 per cent. October looks much better for steel.

In the petroleum world there is a feeling of unrest brought about by renewed cutting of crude oil prices which is expected to spread to mid-continent producers. Soft coal and coke are easier or lower, but anthracite production again is at the peak.

Jobbers and retailers find that seasonal goods are moving actively, although textiles for next spring apparently are selling more slowly. Curtailment is being talked in cotton goods, but in the Carolinas and Georgia, cotton mills are most active, some of them being forced to operate night shifts.

The crops have had more favorable weather for maturing and here the tone is more cheerful, improvements in conditions being noted. Tobacco production is being cut because of heavy losses due to frost in some sections.

Rapid progress is being made in the winter wheat campaign in the way of plowing and seeding. In the winter wheat sections movement is below the average, but is improved in the Northwest.

Car loadings reached the largest total ever recorded for the week ending Sept. 29, showing a total of 1,097,274 cars, an increase of 36,838 over the previous week.

decline in inventories. Shipments doubtless will be expedited and schedules stepped up under the impetus of a current report that an increase in prices is imminent and that manufacturers who recently made reductions will take steps toward restoring lists somewhat nearer their old position.

Truck business is showing some improvement, with producers pursuing more aggressively bus manufacture. More pronounced interest is evident in this medium of transportation, rail operators manifesting a greater inclination to adopt buses as adjuncts to their systems. Manufacturers report many developments in bus construction that will meet current needs and look more into the demands of the future.

Northway in Merger as Well as Winther

Amalgamated Motors Corp. Also Embraces Bessemer and American Motors

NEW YORK, Oct. 17.—Northway Motors Corp. of Natick, Mass., control of which was recently obtained by John M. Mack, will be included in the merger of truck interests known as the Amalgamated Motors Corp. of Plainfield, N. J., provided the stockholders approve of the move. It is understood that Mack will be prominently identified with the new corporation in which are included the American Motors Corp., the Bessemer Motor Truck Co. and the Winther Motor Co.

Proctor W. Hansl, president of the Bessemer-American Motors Corp., and who is expected to head the new corporation, states that the initial capitalization of the Amalgamated Motors Corp. is \$1,000,000 of 8 per cent participating preferred stock and 250,000 shares of common. Provision has been made to increase the capitalization to take care of the additional units figuring in the merger, which will represent total assets of \$5,000,000, he says.

Additional cash working capital of \$1,000,000 will be provided under the terms of the consolidation plans. The company's financial affairs will be handled by Robert Burnser, treasurer of the Bessemer-American Motors Corp., and Irad M. Lewis, formerly president of the Bessemer Motor Truck Co.

Charles W. Blackman also will be identified with the new company. At present, Blackman is cooperating in working out the details of operation.

Hansl Makes Statement

In a statement issued today Hansl says:

The merger has been brought about with the object of coordinating the activities of a group of motor truck manufacturing units operating in widely separated districts under a general plan to develop the sales of each plant largely within the territory that is logically tributary to it.

In carrying out this plan it is not proposed to sacrifice the individuality of name or appearance of the units. All products will be marketed under their present trade names but as existing inventories are worked out running parts will be standardized, with the result that each product will obtain the benefit of the lowest market prices through the increased purchasing power of the entire organization.

Winther Is Included

MILWAUKEE, Oct. 17.—It is stated that the Winther Motor Co., successor to Winther Motors, Inc., will become a part of the Amalgamated Motors Corp.

R. D. Mock, vice-president of the Bessemer company, who formerly was vice-president of the Hydraulic Pressed Steel Co., has been placed in active charge of the operation of the Winther plant.

2 National Transport Studies Being Made

One of Them Follows Recommendations of Agricultural Inquiry Commission

WASHINGTON, Oct. 16—Two separate studies into the transportation of commodities by motor truck are under way here. The Department of Agriculture has a field representative conducting inquiries into relative costs of milk distribution and this study will be followed by investigations into live stock, fruit and vegetables, and other farm products to determine their relation to prices. The National Transportation Institute, an outgrowth of the Joint Commission of Agricultural Inquiry, has made preparations for a comparative study of motor truck and railroad haulage costs.

Browne Conducts Federal Inquiry

The Federal inquiry is under the direction of H. R. Trumbower of the Bureau of Public Roads, with E. L. Browne, an agricultural economist, as the field agent. At present, Browne is located near Baltimore gathering data on distributive costs and prices of products hauled by truck and other carriers. He is familiar with conditions along the Eastern seaboard as investigations into milk supply were made under his direction.

Browne's activities will cover what changes in price of milk, if any, can be attributed to the increased use of motor transport, extent of the dairy industry prior to the installation of motor truck service, amount of road-building stimulated by this movement, dollars and cents savings to consumer in price and quality of milk and effect of good roads on operating expenses of dairy farms and marketing methods.

His investigations will also include research on special types of trucks, with or without refrigerators; comparative bacterial content of milk hauled by truck and train and cost and loss of milk cans by these two carriers.

Surveys Closely Paralleled

The survey by the Department of Agriculture closely parallels the research by the National Transportation Institute. Dr. David Friday of Chicago, formerly president of the Michigan Agricultural College, is the consulting economist in charge of the research work. The head of the organization is James Howard, formerly president of the American Farm Bureau Federation. Other officers include Bird M. Robinson, president of the American Short Line Railroad Association, and Sidney Anderson, formerly chairman of the Joint Congressional Commission on Agricultural Inquiry.

Officials of the institute state that they have been inquiring into regulations of motor traffic in various States, including

Industry So Well Organized Today That Large Stocks of Any Commodity Need Not Be Carried

AN INTERVIEW WITH THOMAS BRADLEY,
Vice-President in Charge of Purchases of the Paige-Detroit Motor Car Co.

By D. M. McDonald,
Detroit News Representative of the Class Journal Co.

Detroit, Oct. 17.

MARKET conditions in 1924 will run much the same as during the present year, according to Thomas Bradley, vice-president in charge of purchases of the Paige-Detroit Motor Car Co., with ample coverage in all classes of commodities required by the industry.

Prices generally will run at much the same averages as have maintained during the present year, in his opinion, with the usual fluctuations incidental to pressure at peak periods. With the lull in buying following the peak periods of the present year, prices have lowered to points inviting coverage over the peak period of next year, especially in steel, Mr. Bradley said, and most other commodities will soon reach points at which it will be safe to buy.

With the expansion of the glass industry, Mr. Bradley estimates that there will be approximately 20 per cent more plate available next year than during the present which will relieve the pressure in this commodity to that extent.

There is no reason for shortage of bodies, either closed or open, Mr. Bradley declared, as there are enough body plants to give the industry all they require if body designs are right, and if the body manufacturer is equipped to operate under modern conditions. Developments of finishing methods which make it possible to complete a body in a day as compared to the former periods required are chiefly responsible for this, he said, but body design has played an important part, in that it has made the finishing methods possible.

The most remarkable thing about the industry today, he said, is the fact that it has kept car prices low, without sacrificing quality, in spite of generally increased commodity prices. This has been possible only by the improvement in manufacturing and production methods with the consequent elimination of waste. Foundry practice has had a remarkable development in the recent past. Development of better machining operations has brought the percentage of rejections of inferior goods to a point where it represents a very small part of the total which were formerly turned back and scrapped.

Competition among supply sources is keener today than it has ever been and is resulting every day in the discovery of new manufacturing methods which represent savings to the manufacturer which in the aggregate run into large sums. This applies even to the smallest articles.

Engineering departments have a most important part in the buying operations of the successful factory today, Mr. Bradley declared. Engineering recommendations must be obtained before a factory will commit itself to the purchase of any commodity, and to give the utmost service to the purchasing department, the engineering department must be able to give prompt consideration to matters that are current. In the case of Paige, he said, engineers were encouraged to solicit bids, as marking their interest in the improvement of the product.

The industry is organized today on a basis of getting material when it wants it, and no longer carries heavy stocks of any commodity. Long time commitments are gone, and are no longer solicited or wanted. Supply sources must have some sort of assurance on which to work if they are to service satisfactorily, and having these, with their own factories organized efficiently, the requirements of the car maker are amply provided for.

studies of taxation. The organization is carrying out many of the recommendations of the Joint Commission which included the suggestion "that the several States cooperate in effecting a uniform basis for taxing motor trucks and other motor vehicles which will fairly represent the reasonable proportion of the cost of highway construction and maintenance chargeable to such vehicles," and "the question of relationship between railways, waterways, and highways should be subject to a rigid analysis in order to determine the economic value of each, and all three should be tied together in as close coordination as possible."

It is said that the institute will at-

tempt to give definite costs figures, which automotive experts say are not available now for either rail or motor operation. One of the objections to the cost figures usually compiled by railroads is the disregard of other elements, as it is felt that operating costs are really a negligible factor in the motor transport situation.

TRUCK COMPANY IN TEXAS

SAN ANTONIO, TEX., Oct. 17—The Texas Manufacturing & Engineering Co. of San Jose, Tex., has been incorporated with \$400,000 capital stock to manufacture trucks and tractors. It is understood that the truck will be produced in 1 and 3-ton capacities.

Bankers Back Move for Bus Extension

Plan to Put Motor Coach Operation in Many Cities Taken Up With Hertz

CHICAGO, Oct. 17—The success of motor bus operation in Chicago by the Chicago Motor Coach Co. a Yellow Cab enterprise, has led to negotiations on the part of certain New York financial interests, with John Hertz, head of the Yellow Cab enterprises, for the formation of a corporation to extend motor coach operation to a number of cities.

Among those who have conferred with Hertz is Charles H. Sabin, chairman of the Guaranty Trust Co. of New York, said to be the head of an interested banking group.

Hertz has issued a statement saying: "Officials of the Chicago Motor Coach Co. have discussed the possibilities of extending operations with groups of men from New York and other cities. But we have no definite plans as yet."

He stated that the manufacture of Yellow coaches will continue in the hands of the Yellow Coach Manufacturing Co. and that the only place for outside capital to become interested is in the formation of operating companies. He said the Fifth Avenue Coach Co. of New York is one of the prospective customers of the company, but would not be interested in any way in the manufacture of the coaches.

The new buses being put into service in Chicago are manufactured by the Yellow Coach Co., a subsidiary of the Yellow Cab Manufacturing Co. The company's factory is turning out coaches at the rate of about one a day and up to this time practically the entire output has been taken by the Chicago operating company, which now has about 155 coaches in service. The factory capacity is being increased and it is expected that before long the company will be in a position to supply equipment to bus operating companies in other cities.

Sale of Templar Factory Awaiting Action of Court

CLEVELAND, Oct. 15—The Templar Motor Car Co., recently organized to manufacture the Templar automobile, bid approximately \$1,200,000 for the plant, equipment and accounts receivable of the Templar Motors Co. at the recent receiver's sale. Only one bid was filed.

The bid provides for payment of taxes now due of \$42,415 and the bidders agree to pay the 1923 taxes as well as the franchise tax. Upon confirmation of the sale and the surrender of the tax receipts the new company will pay \$20,000 in cash and assume a first mortgage of \$1,000,000 held by the Guardian Savings & Trust Co.

The Templar property has been appraised at around \$1,550,000. T. L. Hausmann, former receiver of the Templar

NO ARBITER LIKELY FOR TIRE INDUSTRY

NEW YORK, Oct. 15—Rumors to the effect that the tire industry was seeking a leader comparable with Judge Landis of the baseball world or Will Hays of the movies are discredited in this city. Such a dictator was suggested some time ago, but no action ever was taken, and the idea was abandoned.

"When Horace De Lisser was elected to the presidency of the Rubber Association of America, he advised, in a talk with his directors, that some thought should be given to the idea of selecting some prominent man to take hold of affairs and crack some of the problems confronting tire makers," said one close to the Rubber association, in discussing the report that came from the Midwest Rubber Association meeting in Chicago last week.

"The matter never came up for further discussion, however," he added, "for Mr. De Lisser died soon after and nothing was done on the suggestion. I think nothing will be done, either."

Motors Co., is president of the Templar Motor Car Co., and Joseph G. Fogg of Calfee, Fogg & White, attorneys, is the present receiver for the Templar Motors Co.

No date has been set when the court will act on the sale.

Old Midwest Engine Sued to Force Past Dividends

INDIANAPOLIS, Oct. 15—Suit has been filed in Federal Court here against the old Midwest Engine Co., predecessor of the Midwest Engine Corp., Stoughton A. Fletcher, former president, and the bank which was trustee for the old company, to compel payment of dividends on Series A Preferred stock.

Suit was brought by George B. Ayres of Los Angeles, asking that the court order the defendants to pay into registry of the court \$26,937, past due in dividends and redemptions and future dividends, and that the money be then paid to the plaintiffs.

Up to April 1, 1921, it is said, dividends were paid by the Midwest Engine Co. The October, 1921, dividends were paid by Fletcher. Since then, it is said, no dividends have been disbursed.

The new Midwest Engine Corp., which bought the property and was organized under new management and capital, is devoting its energy largely to repairing railroad freight cars. Its gasoline engine departments, which have been producing some passenger cars and other engines this year, are said not to be operating at present. There has been no Utilitor production this year.

Old Officers Given Coast Tire Control

Stockholders Agree to Their Resumption of Management of \$5,000,000 Concern

OAKLAND, CAL., Oct. 14—Holmes Ives, president, and J. I. Pankratz, vice-president of the Coast Tire & Rubber Co., are to regain control, direction and management of the \$5,000,000 corporation, according to a decision reached at a meeting of the San Francisco Board of Trade.

Management of the company is to be taken from J. B. Lanktree, at present serving as receiver under court orders, and returned to the two officials. The Board of Trade will name a treasurer to handle the finances of the concern, which recently was placed in the hands of a receiver by Judge T. W. Harris of the State Superior Court, at the request of the stockholders.

Lanktree announced the Board of Trade plan is to have Ives and Pankratz post bonds of \$50,000, the sum set by Judge Harris, and to operate the company for thirty days, at salaries of \$500 per month each, their tenure of office depending upon month-to-month appointment.

When Lanktree was appointed receiver by Judge Harris, the directors of the tire company served notice of appeal, and the judge set \$50,000 as stay bond during the process of the appeal. At the meeting of the San Francisco Board of Trade, however, the stockholders meeting with the board agreed that Ives and Pankratz post bonds of this amount and resume control and management.

It was shown at the meeting that the company is solvent, with sufficient assets to meet all liabilities.

Hanch Takes Up Taxes with Budget Director

WASHINGTON, Oct. 13—Questions relating to tax revision, especially the repeal of the excise tax on automobiles, were taken up here this week at a conference between C. C. Hanch, chairman of the Tax Committee of the National Automobile Chamber of Commerce, and General Lord, director of the Bureau of the Budget. The session was informal as Hanch merely sought information to provide a background for the committee's legislative activities.

General Lord explained the requirements of the various Federal departments for the next fiscal year and told Hanch of the need of economy in Government expenditures. He refrained, however, from any direct prediction as to forms of tax revision, as this phase is not within his jurisdiction.

It is expected that the Tax Committee will make a strong drive for the repeal of this discriminatory assessment when the appropriations are actually made by Congress early in December.

Baker R & L Reelects All Former Officers

Stockholders Also Declare Dividends on Both Preferred and Common Stock

CLEVELAND, Oct. 15—Stockholders of the Baker R & L Co. of this city, manufacturing Raulang automobile bodies and Baker industrial trucks, at their annual meeting in this city reelected the old officers and declared dividends at the rate of 7 per cent per annum for preferred and 6 per cent for common stocks.

The financial report showed that the company's surplus account now is approximately \$500,000. As of Oct. 1 the report shows cash and Government securities of \$534,138, accounts receivable of \$405,212; inventories of \$878,343; deferred charges of \$19,928, while the plant and equipment investment is valued at \$1,486,338. Placing patents, good will, etc., at \$1, the total value of the assets is given as \$3,323,962.

In the way of liabilities there is charged \$2,301,500 capital stock; \$272,220, notes and accounts payable; \$138,439, accrued liabilities and \$102,386, reserves.

Officers and directors reelected were: F. W. Treadway, president; E. J. Bartlett, first vice-president and general manager; E. J. Stahl, second vice-president; W. C. Fischer, secretary and treasurer; J. W. Moran, assistant secretary. Directors other than the officers are D. Z. Norton, F. R. White, John A. Kling, J. H. Wade and John R. Raible.

Stephens Assets Ample in Starting New Career

MOLINE, ILL., Oct. 15—Plans for the organization and administration of the Stephens Motor Car Co., Inc., as an independent corporate and operating unit are developing rapidly, and it is said that the new corporation will begin its independent career in an unusually strong financial and manufacturing position.

The company states that it will have ample assets and working capital to carry on its business in a most satisfactory manner, and it is planning for extensive future developments.

It states that its assets will total approximately \$3,800,000, with a current indebtedness of about \$1,000,000. Net assets, therefore, are approximately \$2,800,000. Only common stock will be issued to the amount of \$2,000,000.

LEONARD TRACTOR TRUSTEE

JOLIET, ILL., Oct. 15—William C. Barber, trust officer of the First National Bank, Joliet, has been appointed trustee for the bankrupt Leonard Tractor Co. by Referee O. R. Laraway, and his bond fixed at \$10,000. Salary claims of H. M. Leonard, president, for \$45,000, and John Hurlbut, secretary-treasurer, for \$5,000, will be contested on the ground that ser-

RUBBER ASSOCIATION IS ISSUING CHARTS

NEW YORK, Oct. 15—By means of comprehensive charts, the Rubber Association of America is supplementing its statistical bulletin service, the charts showing in graphic form the exact relationship that exists each month in production, shipments and inventory by curves.

With this service, perfected by General Manager A. L. Viles, members can increase or decrease their production as the inventory curves increase or decrease. When shipments exceed production, the excess demand is taken from inventory.

When shipments are less than production, the inventory naturally increases, so that in reality this new service will act as a barometer to the tire manufacturer.

vice on the judgment, obtained in Indiana, was taken on a janitor and not a director of the company.

Ford Not Negotiating for Lease of Any Pier

PHILADELPHIA, Oct. 17—Whether or not Henry Ford goes further in negotiations for developing another location at the foot of Snyder Avenue and obtaining a new pier at Porter Street, he is going ahead with his plans for the erection of an assembling plant and shipping center on a tract situated along the Schuylkill at Sixtieth Street.

William D. McTaggart, Philadelphia manager of the Ford Motor Co., says that the Ford company is not negotiating for the lease of any pier, as "the Ford company does not lease; it buys outright."

George F. Sproule, director of wharves, docks and ferries for the city government, suggested to a Ford representative, when the company sought to buy land owned by the city near the pier, that the company lease Pier No. 84, at the foot of Snyder Avenue.

This is the third plan for the erection of the new Ford plant here. One of the proposals was the purchase of Hog Island and the old Emergency Shipbuilding outfit there.

Distributing Company to Handle Gary Truck

GARY, IND., Oct. 15—The Gary Motors Corp. has contracted with the newly organized Gary Motors Distributing Co. to sell its output and will confine its efforts hereafter to the manufacturing end.

Robert Crowther, former manager of the Gary plant, has returned from Cincinnati and has again become manager under the new arrangement.

Commercial Bodies Ordered by Japan

Martin-Parry Will Ship 1000 Via New Orleans—They Accompany Ford Chassis

PHILADELPHIA, Oct. 15—Frederick M. Small, president of the Martin-Parry Corp., York, Pa., states that his company has received orders for 1000 commercial bodies to be shipped with Ford chassis direct to Japan within the next thirty days.

This is one of the largest orders for commercial bodies ever placed with the company and is reported to be part of the Japanese program for the rapid reconstruction of cities destroyed by the recent earthquake. The bodies will occupy a complete train and will be taken direct to a special steamer for shipment from New Orleans.

The restoration of commercial transportation is taking foremost place in the Japanese reconstruction program and it is believed that this large order for an American firm will be the forerunner of a large volume of business from this source for American concerns.

Ford Cars and Trucks Ordered

TOKIO, Sept. 21 (by mail)—That the automobile will play a prominent part in the restoration of Tokio and Yokohama is certain. The disaster proved the great utility of the motor car as a medium of transportation, and since then there has been a keen demand for both passenger cars and trucks.

The Hoshi Pharmaceutical Co., with a chain of wholesale and retail stores, has cabled an order to the Ford Motor Co. for 5000 cars and as many trucks on three years' credit. Automobile importers are advising their principals to ship immediately all available cars and trucks, stocks left in the warehouses after the earthquake having been depleted.

To encourage importers, the Government has suspended the duty on trucks to next March and reduced the tariff on passenger cars by one-half. Demand for motor transportation is so keen that every effort will be made to meet it, and it is stated that the reconstruction plans call for the elimination of many of the restrictive laws which heretofore have hampered the sale of automobiles.

Under the new arrangement the construction of motor roads is planned, and it is intended to reduce the price of gasoline.

Prior to the earthquake there were more than 5000 cars in operation in Tokio alone. It is figured that not more than 1000 were destroyed.

—ICHISUKE TAKANO.

AUTO-LITE OPENS CLUB HOUSE

TOLEDO, Oct. 16—Electric Auto-Lite Co. has formally opened a club house for its employees. There are more than 300 members in the Auto-Lite Club, which has been in existence for eight years.

New Transmission Invented in Europe

**Provides for Variable Gear Which
Automatically Adjusts Itself
to Conditions**

NEW YORK, Oct. 15—Harry L. Horning, general manager of the Waukesha Motor Co., back from a hurried trip to England, brings with him details of the new torque converter invented by George Constaninesco which constitutes a radical departure from conventional practice.

As Horning describes it it abolishes the gearbox and clutch and provides an almost infinitely variable gear which automatically adjusts itself to the load and gradient. It is claimed to eliminate friction and noise, besides greatly reducing weight and enabling a much smaller power unit for a given load and speed to be used.

During the war Constaninesco brought out the device which made it possible to fire machine guns mounted on an airplane, so that the bullets passed between the propeller blades at any rotation.

Making Gearshifting Automatic

Gearset development, Horning states, is one of the dominant subjects receiving engineering attention and creating a great amount of speculation in England at present. The engineering development is along lines of making gearshifting automatic.

The epicyclic gear with four forward speeds is undergoing development, and experimental cars are being tested out which show unusual advantages for this type. The feeling has gained much headway with British engineers, Horning says, that the conventional gearbox is not by any means the best unit for the work, and the engineers are attacking fundamentals in the consideration of this subject.

The reduced price of gasoline is having a stimulating effect on the British industry, Horning states, and the highways are filled not only with motor cars but motor buses and motorcycles. Every motorcycle side car carries three to four passengers and double-deck buses are on regular schedule 40 to 50 miles outside of Greater London.

Interest in Commercial Aviation

Commercial aviation is attracting much attention, and manufacturers and engineers are working on developing engines that will keep functioning similarly to a motor car engine. It is not so much a development of higher aviation speed as it is concentrating on improving the reliability of the transportation of passengers.

The aviation engineering development is the outcome of the research work done during the war. Attention is being centered on those engine parts that have given trouble, such as valves, connecting rod bearings and pistons. The greater

GASOLINE AT 9 CENTS NOW SOLD IN DALLAS

NEW YORK, Oct. 15—The average tank price of gasoline in thirty representative cities has declined .67 cent since Sept. 18, a new low of 15.12 cents having been set.

This is a decrease of 3.96 cents from the average of July 30 and a total reduction of 5.99 cents from the high of 1923. Jan. 1, 1921, the average price was 29.3 cents.

Dallas, Tex., is selling the cheapest gasoline at the present time, 9 cents being quoted, while Wilmington, Del., is high with 20 cents.

use of planes for commercial purposes is stimulating this development, and some of the more optimistic persons are looking forward to the day when the British airplane manufacturer will carry on a world-wide commercial business with the small practical plane.

Aviation engine development is being extended to a consideration of the most satisfactory number of cylinders, as well as cylinder sizes. Cylinder sizes up to 150 hp. per cylinder are being worked with.

In British motoring circles the closed automobile is just being appreciated. Its use heretofore has been greatly hampered by virtue of higher costs, but a new appreciation is growing of the value of the closed job.

Four-wheel brakes are considered the right thing on large cars, Horning says, and especially so where driving is in mountainous areas.

Field for Lighting Improvement

Horning believes that there is a great field in England for improved electric lighting in buses and cars. The extension of the use of the bus over the entire country calls for the best there is in lighting. The Tilling-Stevens gasoline electric bus is attracting attention.

Harry Ricardo, who visited America two years ago and addressed the Society of Automotive Engineers on the subject of fuel in engine development, has been at work on engines with heads designed for maximum turbulence and has several jobs that average 40 miles per gallon. He has a stratified charge engine which has been operating for some time and given satisfactory results. The cross-head piston used during the war in the tank engines is climbing its way gradually into industry.

In motor car development, Horning found that the torpedo type of body is being considerably improved, and there is a general increase in the use of aluminum alloys. Vauxhall is coming out with a new engine which will have aluminum connecting rods. Great use is being made of aluminum pistons, and there is a decided tendency to the use of L-head engines with means for creating turbulence.

2 British Companies to Have New Models

Lanchester Will Introduce Smaller Car at Olympia—Sunbeam Plans Changes

LONDON, Oct. 4 (by mail)—At the Olympia Show the Lanchester Motor Co. will introduce a new and smaller six-cylinder model to supplement the 40 hp. chassis. It will be termed 21 hp., the bore and stroke being 2 15/16 x 4 1/2 in. As in the larger model it will have an overhead camshaft with worm gear drive.

A novelty for Lanchesters will be the provision of a four-speed gearbox with side control and a single plate clutch, in place of the three-speed planetary set associated with this make.

Four-wheel braking, disc wheels, thermostatic control of water temperature, magneto ignition, hollow-shaft engine lubrication, unit construction and cantilever rear springs are other features of the specification. The wheelbase is 126 in., track 54 in., and the chassis price, £950.

A new and smaller six-cylinder chassis is also being put forward by Sunbeam. This has an engine of 75 x 130 mm., overhead pushrod-operated valves, unit construction of engine and four-speed gearbox and four-wheel braking; the front set of brakes are of the Perrot-Farman self-contained servo type in which pressure upon a relatively small shoe develops graduated torque which in turn applies a large shoe.

The price of the chassis has been put provisionally at £775.

Smith Wheel Announces New Passenger Car Type

SYRACUSE, Oct. 16.—A new expanded steel passenger car wheel is announced by Smith Wheel, Inc., of this city.

The new wheel combines light weight and attractive appearance with great tensile strength.

It is a refinement of the truck wheel made by the company, is cast in one piece from a special metal alloy, and is hollow through its entire structure. Internal braces are said to give it strength far in excess of normal requirements.

The wheel has six spokes. There are few flat surfaces.

K. & M. IN RECEIVERSHIP

KENOSHA, WIS., Oct. 15—Involuntary bankruptcy proceedings have been instituted against the K. & M. Manufacturing Co., a manufacturer of steering gears, tools, dies and metal specialties. Debts of more than \$100,000 are alleged in the petition, signed by Paul H. Fieberg & Co., with a claim of \$2,600; Samuel Harris & Co., \$212, and Ben H. Page, \$536. H. D. Maddock of Kenosha has been appointed receiver.

Men of the Industry and What They Are Doing

Studebaker Executives Sail

M. F. Wollering, vice-president in charge of manufacturing of the Studebaker Corp.; E. J. Miles and Vincent Link, consulting engineers, and R. E. Scratch, assistant to Wollering, have sailed for Europe to attend the continental shows.

Klinedinst Succeeds MacKenzie

R. E. MacKenzie, after four years' service as advertising manager of the Timken Roller Bearing Co., has resigned and is succeeded by L. M. Klinedinst, who, at the same time will continue as assistant manager of sales. Carter Miller will be actively in charge of the advertising department, with the title of assistant advertising manager. Miller has been with the company for five years and until recently was district manager of the service department. The company's advertising will be handled by the Fuller & Smith Co. of Cleveland.

Yerkes Treasurer of Link-Belt

Richard W. Yerkes, formerly general manager of the Link-Belt Co.'s Philadelphia plant, has been appointed treasurer of the company, succeeding B. A. Gayman. The latter will head the newly acquired Meese & Gottfried Co. of San Francisco. Yerkes will be located at the company's general offices in Chicago.

James J. Flynn Resigns

James J. Flynn has resigned as sales manager of the Durant Motor Co. of New Jersey, with headquarters at Elizabeth. He joined Durant in 1922 after seven years' connection with the Chevrolet Motor Co. at Baltimore and Cincinnati.

Sternberg Blakely Sales Head

Harry S. Sternberg has been appointed sales manager of the Blakely Manufacturing Co. of Detroit, maker of automobile shipping fastenings. Charles A. Goodspeed, factory manager, will continue in charge of manufacturing, and W. W. Blakely will devote his attention to the development of new lines.

Lindholm Represents Van Norman

A. C. Lindholm has been named as representative of the Van Norman Machine Tool Co. of Springfield, Mass. Lindholm formerly was general manager of the Franklin Machine & Tool Co., which recently was merged with the Van Norman company, and has had wide experience in the production and use of precision machine tools.

Hirsch Succeeds Mathewson

R. T. Mathewson, district manager of the SKF Industries, Inc., of Buffalo, retires from that position Nov. 1 to devote

his entire time to the development of the products of the Nichols & Wright Motor Co. of Buffalo. He is to be succeeded by Robert R. Hirsch, transferred from the Philadelphia office. Mathewson has been with the SKF Industries since its organization, prior to which he was identified with the SKF Ball Bearing Co. of Hartford, Conn. The Nichols & Wright Motor Co. formerly manufactured two-cycle engines and farm lighting equipment, but under Mathewson's direction has of late been making automotive parts and accessories. It intends developing anti-friction products.

Meehan Manages Research Club

Jack Meehan, for several years manager of the Brunner Manufacturing Co., air compressor manufacturer in Utica, N. Y., is to become manager of the Research Club, Nov. 1, with headquarters in Chicago. The Research Club is an organization of approximately twenty non-competing jobbers in American and Canadian cities. Meehan spent some time in the jobbing field before joining the Brunner staff. He goes to the Research Club with the advantage of experience both in manufacturing and jobbing problems and with a wide acquaintance throughout the trade.

W. J. Bryan Joins Heintz

W. J. Bryan announces his association with the Heintz Manufacturing Co. of Philadelphia. His headquarters will be in the General Motors Building, Detroit.

Corcoran Represented by Dorney

William R. Dorney has succeeded Joseph P. McCarthy as representative of the Corcoran Manufacturing Co. of Cincinnati, maker of fenders, hoods, radiators and tool boxes, in the territory east of Pittsburgh and in the Southern Atlantic States. The Peerless line in the Southern States remaining and certain parts of the Central territory will be represented by Roscoe Hovatter.

Wechsler in Charge at New York

L. Wechsler has been chosen as general sales manager of the New York office of the Canton Foundry & Machine Co. of Canton, Ohio, maker of alligator shears, portable floor cranes, turntables, etc., at 203 East Fifteenth Street. M. Bergere, formerly in this position, now is in charge of the company's New England division, with headquarters at 261 Broadway, New York City.

William I. Irvine with Agency

William I. Irvine, who was connected with the Department of Commerce until recently, and previously had been connected with the White Co., has become a member of the United States Advertising Corp., Toledo.

Appointments by Peerless

Earl B. Wilson, who has been doing special work in the sales department of the Peerless Motor Car Co. for the last year, has been appointed sales manager of the branch division, while S. I. Kirby, former wholesale sales manager of the New York Peerless branch, has been made sales manager in charge of distributors.

Monihan in Charge at Detroit

John Guy Monihan, former president of the Harroun Motor Car Co. and well known as a pioneer in the automotive industry through his connection with Pathfinder and other early companies, has been placed in charge of the automotive division of the Newport News Shipbuilding & Dry Dock Co. of Newport News, Va. He has opened headquarters in the General Motors building, Detroit. The first product to be manufactured by the newly organized division is the Flex-silent disc wheel.

Day Making Tour of West

V. H. Day, general sales manager of the General Motors Truck Co. of Pontiac, is visiting all his district sales managers in the West and along the Pacific Coast for the purpose of reviewing transportation conditions throughout the entire Western and Pacific Coast territories where heavy demands for trucks are expected in the farm territories.

Leeds Sells Interests

F. L. Leeds has disposed of his holdings in the Monogram Lens Corp. and will announce his plans shortly.

Reeves Says All Cities Need Traffic Engineers

CLEVELAND, Oct. 17—Every city of importance in the United States should employ a traffic engineer with a staff of assistants to study traffic conditions and apply needed remedies, Alfred Reeves, general manager of the National Automobile Chamber of Commerce, told the Cleveland Automobile Manufacturers and Dealers' Association at a meeting here. The rulings of the traffic engineer should be final, he declared.

The huge volume of motor traffic has made necessary the employment of traffic experts and a careful study is needed not only to meet present day traffic requirements but also to plan for the future. If that is not done the congestion in the large cities will be stifling, Reeves said. He added that the city will grow in the future in proportion to the ability it shows in providing ample accommodations for motor vehicles.

Reeves reviewed what has been done in this respect in Massachusetts and Connecticut. Figures were cited showing the size and economic importance of the automobile industry.

Brake Construction Discussed by Crane

Paper Read Before Section of
S. A. E. Takes Up Fundamentals of Design

NEW YORK, Oct. 18—Henry M. Crane's paper entitled "Some Notes on Brake Design and Construction," read before the Metropolitan Section of the Society of Automotive Engineers here tonight, dealt almost entirely with fundamentals and details of brake design, but contained no references to the subject of four-wheel brakes.

Crane said in substance that much of the difference in opinion regarding brakes arises from the widely different service requirements encountered in various parts of the country. He presented data regarding the power absorbed by the engine when used as a brake and said that the engine is such an excellent brake that it seems only reasonable to expect it to supplement other brake equipment.

Among the desirable features and characteristics of brake design Crane listed the following: Maximum retarding effect with reasonable application of physical effort, ability to produce smooth retardation, retarding effect directly proportional to pedal pressure, freedom from tendency to self-lock, durability combined with infrequent need for adjustment, ease of adjustment when this is required, easily operated and dependable locking devices on hand brake, and convenient location of brake pedal and lever.

Brake Layouts Taken Up

Passing over servo mechanisms with which, said Crane, almost any results are possible, attention was drawn to the need for brake layouts in which the operating mechanism is as direct and simple as possible, centers are correctly placed and the major portion of the multiplication takes place at the brake.

Crane advocated brakes of large linear dimensions as a means for reducing unit pressures and decreasing wear, but said that brakes of small size in which provision is made for good circulation of cooling air may be better under some conditions than larger brakes which are shielded in such a way as to interfere with adequate heat dissipation. It was pointed out that the use of smaller wheel centers has placed a definite limit on the size of wheel drums.

After comparing the advantages and disadvantages of expanding and contracting brakes, Crane reached the conclusion that the balance of advantage is in favor of the contracting band type, especially in districts where most travel is on hard roads.

MAY ACQUIRE ROLLING MILLS

MILWAUKEE, Oct. 15.—It is expected that negotiations will be concluded by Nov. 1, by which the Inland Steel Co., Chicago, will take over the

entire capital stock of the Milwaukee Rolling Mills Co., established in 1920 to manufacture galvanized, black and blue annealed sheets. A plant with a capacity of 60,000 tons a year was erected and is now employing 1000 men, operating at full capacity. It is situated on a 25-acre site in West Allis and represents an investment of more than \$1,500,000. This is the only sheet mill west of Chicago and has built up a large trade in the automotive industries as well as among corrugated building supply makers.

Ford Increases Sales 466,433 in 9 Months

DETROIT, Oct. 16—Sales of Ford cars and trucks in the United States for the first nine months of the year totaled 1,354,020, an increase of 466,433 over the same months of 1922. September totals showed 141,467 cars and trucks delivered at retail, a gain of 35,029 over September of last year. Truck sales for the month were 15,947 or 4589 more than for the same month last year.

Ford engine No. 8,500,000 was completed at the factories in Highland Park on Oct. 4.

Indications at this time are that November production will be continued at capacity rate, according to the company's sales department which reports demand from dealers to be still in excess of output. There is no stocking of cars in dealers' hands or at the company's assembly branches. On the contrary, the movement of cars is somewhat faster than the factory's production capacity. Some disparity in the production and delivery totals in September was occasioned by delays incidental to changing of models.

Ford's Output for Week

DETROIT, Oct. 15—Ford Motor Co. production for the week ended Oct. 9 totaled 40,792 cars and trucks for domestic sale, 1906 tractors and 186 Lincolns.

Toledo Plants Prepare for Output in Spring

TOLEDO, Oct. 16.—Local automotive plants are preparing for increased business in the spring and are beginning to speed up on late fall orders.

The weekly survey of the employment conditions in local plants which has shown a normal decline in some factories for the last month now indicates a surprising change for the better.

The Willys-Overland Co. has let the contract for a \$350,000 storage plant for driveaways at the local factory. The new building will be three stories and built of concrete, steel and brick. Two new dormitories to replace the one burned last summer are being planned. They will have a housing capacity for 400 skilled workers.

The Electric Auto-Lite Co., has enlarged its plant at Adrian, Mich., putting on about 200 more workers and is now seeking to enlarge its force at Toledo all in the interest of the production set for 1924.

Balloon Tire Future Remains with Owner

J. E. Hale of Firestone Presents
Paper at Meeting of Section
of S. A. E.

INDIANAPOLIS, Oct. 15—The Firestone company thought it was bringing out a luxury tire when it first began the manufacture of balloon casings, but its experience since then has convinced it that from the moderate priced field will come the greatest demand for this radical innovation. This was the report made to 175 members of the Indiana Section of the Society of Automotive Engineers by J. E. Hale of the Firestone Tire & Rubber Co., in his paper on balloon tires.

Hale talked mostly on the attitude of the owner to this departure from past practice. He also told of tests given the tire by Cannonball Baker in stunt drives in a Cole in one of which Baker experienced a blowout of a front tire while going 55 m.p.h., the only difference being a little added twisted effect over that experienced with conventional types. Once Baker drove fifteen miles with a flat balloon tire at more than 70 m.p.h.

Films Shown by Hale

Hale not only showed slides but had one reel of film slowed up to show the peculiar action of balloon tires while running over rough roads and curbs.

In the discussion that followed, Charles Crawford, chief engineer of the Stutz Motor Car Co. of America, agreed with Hale that it will be the owners who will force the use of balloon tires. J. J. Cole, speaking from his own experience, said that he never wants to ride on conventional tires again.

C. R. Short, chief of mechanical engineering of the General Motors Research Corp., declared that it was up to the manufacturers to redesign chassis and make changes that will enable them to get the most out of the peculiar advantages of balloon tires in the way of eliminating vibration.

Kettering Speaks in Chicago

CHICAGO, Oct. 12—In his talk before the Midwest Section of the Society of Automotive Engineers last night, Charles F. Kettering of the General Motors Research Corp. suggested a revision in the teaching of engineering. The automotive engineer, he said, needs to become more of a business man.

Balloon tires, Kettering said, no doubt will receive a great deal of attention in the next few years. He pointed out that a car designed especially for the use of balloon tires probably would be vastly superior to the present day design, where the balloon tires merely replace another type.

Kettering expects to see most of the troubles due to carbon deposits, crankcase oil dilution and other causes eliminated in the future.

Engineers Arrange Production Meeting

S. A. E. Schedules Four Important Sessions for October 25 and 26 at Cleveland

CLEVELAND, Oct. 15—Plans have been completed for the second national production meeting of the Society of Automotive Engineers, to be held in the Winton hotel here Oct. 25-26. An attendance of at least 600 is expected.

The program calls for four important sessions and an informal dinner. On the first day, Thursday, there will be a machine tool session in the morning, a meeting for factory managers in the afternoon and a scientific management session in the evening. On Friday there will be an inspection session in the morning, while the afternoon will be devoted to visiting local factories. In the evening the dinner will be held.

Speakers for the various meetings have been selected. H. P. Harrison of the H. H. Franklin Manufacturing Co. will discuss the application of conveyor equipment to automobile production, citing examples of successful installations and others which have proved inefficient. E. Bouton of the Chandler Motor Car Co. is scheduled to talk on the regulation of straight piece work and the group plan of wage payment. He will describe the system in successful operation at the Chandler plant.

To Tell of Grinding Development

Oscar A. Knight of the Norton Co. is on the program to tell of the developments in production grinding in the automotive industry and will illustrate his talk with photographs. Ralph E. Flanders of the Jones & Lamson Machine Co., will discuss the advantages and limitations of standard machine tools for continuous production. Albert F. Shore of the Shore Instrument & Manufacturing Co. will give information on the use of the scleroscope in studying material hardness. E. P. Bullard of the Bullard Machine Tool Co. will describe two special purpose machine tools of high productivity.

W. F. Jameson of the Cleveland Automobile Co. is scheduled to talk on the human element in production. Percy S. Brown of the Corona Typewriter Co. will give a paper covering every detail of production control as utilized in the Corona plant. A. J. Ott and C. L. Ott of the American Grinder Co. will describe a process of grinding gear teeth of the involute form to contours of high accuracy. A. H. Frauenthal of the Chandler Motor Car Co., will describe factors governing the measurement of "out-of-roundness."

ADDITION TO NASH PLANT

Nash Motors Co. is building an addition to its six-cylinder car plant in Kenosha, Wis., and not in Milwaukee, as stated in AUTOMOTIVE INDUSTRIES. The

new building is 600 x 190 ft. and is to be used for the housing of finished cars ready for shipment. Including the plant at Kenosha, the Nash plant at Milwaukee and the Seaman body plant, also at Milwaukee, one-half ownership of which is vested in the Nash Motors Co., there are 156 acres of ground devoted to production. More than 2,400,000 sq. ft. of floor space is at present occupied by various departments, and more than 7000 workmen are carried on the payrolls.

Ford's Plans Incomplete for Johansson Gauge Co.

DETROIT, Oct. 15—The sale of the Johansson Gauge Co. of Sweden was negotiated in Europe by E. C. Kanzler, superintendent of the Ford company. Kanzler still is in Europe and details of the purchase are incomplete, but officials declare that it undoubtedly is the intention of the Ford interests to continue the supplying of the Johansson gages to the industry generally.

Details of how the Johansson company will become part of the Ford organization have not been completed, but it is expected that the present executives of the Swedish company will continue, with the probability that more of the company's activities will be transferred to the United States. The Ford laboratories at Dearborn may become the site of the principal operations of the organization.

Ford's purpose in buying the Johansson company has not been stated other than that it gives the company its own source of supply of precision instruments and is part of the policy of the company of controlling all its requirements.

Steel Treating Problems Discussed at Convention

PITTSBURGH, Oct. 12—Metallurgists from automotive manufacturing plants attended in large numbers the fifth annual convention of the American Society for Steel Treating which closed here today. The convention which opened Monday included a big steel exhibit, as well as discussions of current steel treating problems.

Papers of special interest to the automotive industry were read by H. M. Williams, metallurgist, General Motors Research Corp., on "Automobile Sheet Specifications," and by C. G. Shontz, metallurgist, Perfection Spring Co., on "The Manufacture of Automobile Leaf Springs."

Among the automotive metallurgists at the convention were: E. W. Ehn, Timkin Roller Bearing Co.; W. P. Woodside, Studebaker Corp.; Don Stacks, Robert Schenck, Buick Trucks, Inc.; J. H. Nelson, Wyman-Gordon Co.; R. H. Allen, Rolls-Royce of America, Inc.; F. P. Gilligan, Henry Souther Engineering Corp.; W. E. Day, Jr., Mack Trucks, Inc.; F. E. McCleary, Dodge Brothers; J. L. McCloud, Ford Motor Co.; Herman L. Greene, Willys-Overland Co., and John B. Daley, General Motors Corp.

7 Reasons Assigned for Simplification

Automotive Simplified Practice Committee Sets Forth Basis for Program

NEW YORK, Oct. 17—The Automotive Simplified Practice Committee, of which M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, is chairman, has fired the first gun in its campaign by adopting the "Seven Reasons for Simplification," as drafted by M. Lincoln Schuster of the M. A. M. A. and John C. Long of the National Automobile Chamber of Commerce.

These reasons are the fundamentals on which the committee's platform will be based and will be broadcast by the constituent members of the committee in the effort to bring about simplification in manufacturing, as suggested by Secretary Herbert Hoover of the Department of Commerce.

The constituent members are as follows:

Aeronautical Chamber of Commerce, American Automobile Association, Automotive Equipment Association, Automotive Electric Association, Motor and Accessory Manufacturers Association, Motorcycle & Allied Trades Association, Motor Truck Industries, National Automobile Chamber of Commerce, National Automobile Dealers Association, Rubber Association of America and Society of Automotive Engineers.

What Seven Reasons Are

The "Seven Reasons for Simplification" are as follows:

1—Simplification means standardization of those specifications and sizes in automotive construction where individuality is neither necessary nor advisable.

2—Simplification, through saving of cost and effort on many details, makes possible greater individuality with respect to those factors where distinctive style or size is an asset.

3—Simplification reduces cost to the manufacturer by permitting greater mass production and reducing capital outlay.

4—Simplification reduces cost to jobber and dealer by calling for smaller inventory and a quickening turnover.

5—Simplification reduces cost to automobile users through lower price and lower maintenance cost.

6—Simplification improves service to user by making it easier to repair and replace parts and units.

7—Simplification in the words of Emerson, means the adoption of those standards "established by investigation or authority to be a reasonably attainable maximum of desirability."

YELLOW TO USE DISTRIBUTORS

CHICAGO, Oct. 13—The Yellow Cab Manufacturing Co. announces that its new 1-ton truck, the Yellow Cab Express, will be marketed through distributors. This is a departure from the company's method of selling taxicabs, which is direct through its own traveling sales representatives.

Dodge Takes Larger Quarters in Canada

Moves from Railroad Terminal—
No Change Planned in Manufacturing Methods

DETROIT, Oct. 17—Dodge Brothers has removed its Canadian headquarters from the terminal of the Canadian Pacific Railroad to the plant in Windsor formerly occupied by the Walker Twist Drill & Tool Co. The new quarters are leased and will give the company greater facilities for the handling of its business in the Dominion.

Aside from the fact that the new building will give the company more space for its increasing business in Canada, the removal does not mean any change in the Dodge method of building for the Canadian market. For the last few years Dodge Brothers has built cars completely in its Detroit factories, and shipped them under their own power to Windsor where many American parts were removed and Canadian parts and equipment substituted.

By using as many Canadian built parts as made possible by manufacturing facilities and construction features, the import tax was greatly reduced. Dodge Brothers has no manufacturing plants in Canada, the parts changed being mainly equipment items such as tires and wheels.

The company does not contemplate any manufacturing activities in Canada at this time. It will continue to expand its business under the present method of assembly and the new quarters will enable them to meet the needs of the Canadian market for some time. Cars are shipped to all parts of the Dominion from the Windsor plant following their completion with Canadian made equipment.

The company owns seven and one-half acres in Windsor on which it has been reported several times it had planned to build. John R. Lee is in charge of Canadian activities.

23 Acres of Floor Space in Ford's St. Paul Plant

DETROIT, Oct. 16—With ground broken for the assembly and manufacturing plants of Ford Motor Co. at St. Paul, some details of the general construction are released by the company. The plant proper will be one story in height, 1,720 feet long by 600 feet wide, inclosing more than 1,000,000 sq. ft. or 23 acres of floor space. The building will be faced with stone on three sides to conform to the general beauty of the surroundings.

The manufacturing plant, 100 feet above the level of the river, will connect with river loading platforms by means of tunnels running back underneath the factory to elevators which will carry freight directly into the buildings. This

is in anticipation of a new era of river transportation on the upper Mississippi, it is noted. Already a self propelled steel barge carrying 150 tons of freight has passed through the locks and docked at Minneapolis.

In addition to the water shipping facilities, the Chicago, Milwaukee & St. Paul railroad is building a branch line direct to the plant.

The power house of the hydro-electric development will be 160 feet long, 74 feet wide and 48 feet high above the foundations. In exterior treatment it will conform to the same design of other Ford projects. The generator room will extend the full length of the building and will be 35 feet wide and 36 feet high. It will be equipped with a traveling crane capable of handling all machinery to be installed. Four water wheels of 4,500 horse power each will be installed in concrete scroll cases with concrete draft tubes. A steam power house will also be built as an auxiliary.

New Jewett Plant Starts After First of New Year

DETROIT, Oct. 17—Production in the new Jewett plant of the Paige-Detroit Motor Car Co. will not start before Jan. 1, when the company will be in a position to manufacture 500 Jewetts daily in the new plant, and 200 Paiges daily in the former main plant. This present main plant is now three-quarters occupied by Jewett production which is averaging about 180 a day.

Installation of machinery in the Jewett plant is now under way. All of the concrete flooring has been laid and the building is entirely inclosed and has been divided according to departments. With the completion of railroad sidings everything will be in readiness to receive the main part of the machinery.

Appraisers Appointed to Value Vim Property

PHILADELPHIA, Oct. 17—M. J. Mac-Namara and John P. Hill have been appointed appraisers, with William P. Rowland, to value the property of the Vim Motor Truck Co., and report to the United States Court for the Eastern District.

The petition of the Littlehale Advertising Agency, Inc., New York, against the company for the appointment of a receiver, has been dismissed by the court for lack of jurisdiction, the amount involved in that particular case being less than \$3,000, and the claim not having been reduced to a judgment.

The amount claimed by the agency was \$252 for services between January and June of the present year. Receivers, however, had been appointed on another petition.

ORDERS 500 TAXICABS

CLEVELAND, Oct. 17.—The Quaker City Cab Co. of Philadelphia, has placed with the White Motor Co. of this city an order for 500 taxicabs.

Chevrolet Is on Way to Million Car Year

Expects to Market 800,000 in 1924 and Step Up to 1,000,000 Class in 1925

DETROIT, Oct. 17—The Chevrolet Motor Co., with the completion of its major building operations, will enter 1924 with the anticipation of marketing approximately 800,000 cars, and is looking forward to reaching the million-a-year class in 1925.

Production at plants of the company will be gradually stepped up as distributing channels are opened, November witnessing an increase from the present 2200 daily to 2500 daily. These distribution plans are for the United States market only.

Under the direction of Colin Campbell, general sales manager, Chevrolet now has divided the United States into twenty-three sales zones, each of which is under the immediate direction of a zone sales manager operating under Campbell.

Zone Headquarters Established

Zone headquarters are at Flint, Tarrytown, St. Louis, Minneapolis, Kansas City, Oakland, Fort Worth, Atlanta, Cincinnati, Denver, Chicago, Buffalo, Pittsburgh, Baltimore, Philadelphia, Charlotte, Memphis, Des Moines, Portland, Los Angeles, Janesville, Louisville and Oklahoma City.

Seven assembly plants are now in operation, each with its own body assembly unit, placing the company in a position to meet demand for all models. In addition to the new Buffalo and Cincinnati plants, these are at Flint, Tarrytown, St. Louis, Janesville and Oakland, Cal. The Flint plant, in addition to building the engines for all plants, is now assembling 400 cars daily.

Tarrytown also is on a 400 daily basis, as is St. Louis. The Janesville plant is building 250 cars daily, and the Oakland, Buffalo and Cincinnati plants, 200 a day. In each of these this output will be gradually increased.

Supply Specific Territories

Each of these plants, although designed to supply specific territories, will serve to supply all territories as demand may fluctuate.

Manufacturing plants, in addition to the Flint plant, are the gear and axle group in Detroit, comprising three factories which supply gear axles and such forgings as crankshafts and piston rods. Transmissions are made at the Toledo plant.

At Bay City such small parts as rocker shafts, piston pins, fan shafts, screw machine parts and hardened and ground machine parts are made. With these plants which manufacture for Chevrolet alone, the company also takes a large part of the output of other General Motors subsidiaries.

White Seeks to Stop Flood of Poor Laws

Launches Campaign Against High Taxes and Restrictive Truck Measures

CLEVELAND, Oct. 17.—The White Motor Co. of this city has started a campaign to impress lawmakers with the necessity of unifying all means of transportation into one system and to keep the shoulders of the automobile industry free from a burden of restrictive laws and taxation that would crush all initiative.

A statement issued by the company sets forth that the motor industry is now in the legislative period of its development and a flood of measures has followed in the wake of the wider utilization of trucks and passenger cars. There have been some wise measures passed it states, but many destructively restrictive laws have been enacted.

Motor Vehicles Cooperating

Some of the points brought out in the statement follow:

It is not generally understood that the burdens of assessment placed against the industry in many States have been out of all proportion to its ability to pay; that the motor vehicle has been the most powerful influence toward the building of better roads and that trucks and buses are actually cooperating and not competing units in the transportation system.

Instead of opposing intelligent regulation and taxation, the automotive industry has consistently advocated reasonable regulations and imposition of taxes sufficient to cover the entire budget of State highway departments for the maintenance of improved highways.

The total of motor taxes in 1922 was \$324,901,209, and in some States the amount of taxes paid exceeded the budget for highway maintenance.

One of the largest truck manufacturing companies has paid out in dividends over \$12,000,000 in a period of years, but it has paid more than this amount in the same period in the form of Federal and State taxes.

Standard Code Needed

While exact uniformity of regulations and restrictions may not be possible, it is certain that manufacturers and operators of trucks and buses, as well as highways engineers, must be given some fairly standard code, acceptable to the States as a whole, upon which the problem of weight, speed and tire impact may be worked out.

It is being recognized that it is folly to bar the so-called heavy truck from the roads, for such a procedure would result in the use of two trucks instead of one, with consequent greater damage to the roadways as well as higher operating costs.

In the matter of gross weights there should be a limit. The motor vehicle conference committee has submitted its proposal for 14 tons gross and upon this basis highways of the future are likely to be built.

Speaking of highways, the statement points out that the public should be educated to consider the value of good roads

from the standpoint of actual decrease in the cost of commodities through decrease in the cost of transportation. Highways should be so constructed, it urges, that they can carry the necessary traffic rather than be so poorly built as to act as a bar to economical hauling.

The statement then proceeds to say:

State lines should no longer be drawn in transportation matters and legislatures should act to make uniform highways rules and regulations, together with laws as to licenses and fees, for the purpose of encouraging motor transportation and therefore for the purpose of decreasing costs to the consumer.

In every State, the public, as the buyer of transportation, should unite with the owners of motor vehicles and seek wise legislation that will improve transportation systems and arteries.

Prices of Locomobile Cut \$1,000 to \$2,600

BRIDGEPORT, CONN., Oct. 15.—Drastic reductions in the price of the Locomobile cars, ranging from \$1,000 to \$2,600, have been announced by the Durant Motors Co. The biggest drop is made on the limousine, which now lists at \$9,000 instead of \$11,600.

The following shows the old and new prices:

	Old Price	New Price
4-passenger phaeton.....	\$ 9,500	\$ 7,900
7-passenger phaeton.....	9,600	7,900
5-passenger sedan.....	12,200	11,200
Coupe-limousine.....	11,750	10,600
Limousine.....	11,600	9,000
Cabriolet.....	12,200	11,200

Clydesdale Fixes Prices on Full Line of Trucks

CLYDE, OHIO, Oct. 17.—Clydesdale Motor Truck Co. has fixed the following prices on its line:

¾ to 1¼-ton.....	\$1,785
1 to 1½-ton.....	2,350
2-2½-ton..... (156 in. Wheelbase).....	2,650
2-2½-ton..... (170 in. Wheelbase).....	2,700
Model 6X—2½ to 3½-ton. (163 and 180 in. Wheelbase).....	2,975
Model 6—2½ to 3½-ton.....	3,300
Model 4X—3½ to 5-ton.....	3,975
Model 4—3½ to 5-ton.....	4,200
Model 2—5 to 7-ton. (176 in. Wheelbase).....	4,500
Model 2—5 to 7-ton. (204 in. Wheelbase).....	4,550

Exhibitors Announced for Season's Salons

NEW YORK, Oct. 15.—Announcement is made that the following cars will exhibit at the nineteenth annual Automobile Salon to be held at the Commodore in New York Nov. 11 to 17 and repeated at the Drake in Chicago Jan. 26 to Feb. 2: Cunningham, Daniels, Duesenberg, Isotta Fraschini, Lancia, Minerva, Renault, Rolls-Royce and Winton.

Coachmakers will exhibit the Cadillac, Excelsior, Hispano Suiza, Lincoln, Locomobile, Marmon, Packard and Peerless.

Body exhibits will be made by Brunn, Cunningham, Dietrich, Fleetwood, Healey, Holbrook, Hume, Judkins, Le Baron, Merrimac, Schutte and Springfield.

Study Shows Farmer Can Take More Cars

N. A. C. C. Survey Finds That Saturation Point with Him Is Far Distant

NEW YORK, Oct. 17.—Research on the part of the National Automobile Chamber of Commerce, followed by deductions based on the registration figures of 1922, discloses that the saturation point is far off so far as the farmer is concerned and that the sales possibilities of the rural districts are something well worthy the consideration of factory executives.

This research has resulted in General Manager Alfred Reeves advising members of the opportunity they have among the farmers. Reeves finds that the farm market for automobiles is still undeveloped compared with the rest of the country.

Although the farmer owns 30 per cent of all the motor cars, yet this is not his proportionate share of the business on the basis of population, Reeves finds. There are only seventy cars per thousand persons in the rural districts as compared with 127 automobiles per thousand in towns and cities of 1000 population and upward, he declares.

Analyzing the research, Reeves says:

The ownership of motor cars is proportionately heaviest in the villages of 1000 to 5000, which have but 9 per cent of the population of the United States and yet owns 20 per cent of the total automobiles. Stating it another way, these communities have one motor car for every 4.4 persons, or 230 cars per thousand persons.

It may be that the rural use of the car is more intensive than would appear from these figures, because it is probable that thousands of cars actually owned on farms are registered as from the nearest small town. This, too, would account for the extra heavy registration in the village group.

Studebaker Gives Medals on Birthday Celebration

SOUTH BEND, IND., Oct. 15.—Service medals were presented to 1470 South Bend employees of the Studebaker Corp. at its seventy-first birthday anniversary party held at Springbrook Park. Presentations were made to employees who have served the corporation continuously for periods of five, ten, fifteen or twenty years or more. Of this number 220 have been with Studebaker for from twenty to sixty years.

The 1470 presentations were only a part of the medals awarded by the corporation to employees throughout the world. Three thousand medals in all will be distributed. Employees at the Detroit and Walkerville factories and in the company's branches elsewhere will receive them.

Adolph Wolters, for fifty-one years in the employ of Studebaker and still active in the service, was personally decorated with a medal by President A. R. Erskine.

Credit Is Big Need for Sales in Mexico

Elections Will Clear Atmosphere
—W. W. Mohun Finds Cuban
Conditions Good

DETROIT, Oct. 16.—Good conditions in Mexico from the viewpoint of the American passenger car or truck manufacturer are not likely to become evident before the coming presidential elections in that country and the general stabilization of the banking situation, according to Ward W. Mohun, export sales manager for the Federal Motor Truck Co., who was in Mexico City when official recognition by the United States was announced.

The immediate effect of recognition has been to restore a large measure of good will on the part of Mexicans generally toward the United States and business men beyond the Rio Grande are looking forward to extensive business developments, Mohun said.

Credit Facilities Negligible

The fact remains, however, he said, that the credit facilities of the country are negligible at present, and until there has been some sort of establishment of routine banking practice only limited business can be transacted.

Automobile and truck merchandising is handicapped by the lack of available credit, as practically all of the sales in that country are on a time basis, as they are in the United States. Without banks to discount his paper the dealer is compelled to carry it himself which means that only a limited business can be done. Manufacturers in some cases have established credits for their dealers which enables these particular makes to outsell lines without special credit connections.

The potential business prospects for American automotive manufacturers are very bright, Mohun said, as the country contains all the elements of great prosperity and there is a steady road development movement, which will bring automotive transportation into demand.

Should the successor of President Obregon enjoy the confidence of the people it is likely that the development of the country will be undertaken almost immediately both by natives and foreign capitalists, Mohun said.

Conditions in Cuba Different

The Cuban situation is quite the opposite of that in Mexico, said Mohun, and promises plenty of business both for car and truck manufacturers through this year and next. The country is in good financial condition, has no stocks of cars or trucks, and, with good crops of sugar, fruits and tobacco for which there is ready market, should be a large buyer. Cuban automotive business suffers for lack of a highway system, but the government is working toward a system of interconnecting routes which will remedy this.

Although shipments of trucks are going toward Japan now, Mohun does not expect the real demand for trucks or machinery of any kind to come for several months, or until it is possible to clear away the wreckage caused by the disaster. Restoration work will be delayed until the work of clearance is completed, but when started, Mohun said it will result in large business for American manufacturers generally.

Except in automotive lines, he expects a large part of the Japanese business to be placed in Europe because of lower prices. Despite higher prices, however, America will get the largest part of all business because of its greater production facilities, Mohun stated.

Export markets, with the exception of Europe, promise great business for American car and truck makers in the coming year. He said that business will probably outdistance the present year which is the best manufacturers have had since the war. Federal, he said, already has shipped abroad three times as many trucks this year as last, and he sees no abatement in the demand.

Government Publishes Foreign Trade Manual

WASHINGTON, Oct. 15. — After months of careful study the Automotive Division of the Department of Commerce has issued the "Automotive Foreign Trade Manual." Several hundred copies of the manual have been sent out to the trade this week in an attractive binder.

It is pointed out that the manual is confidential and information contained therein should not be published under any circumstances and that the same is furnished with the understanding that it is to be used only for the benefit of the American firms and individuals. Separate binders have been made for the automotive trade association.

The manual is so arranged as to permit insertion of manual sheets whenever received by the Department of Commerce.

In the subject classification information relating to a specific geographical section is subdivided under the following heads:

Basic Factors—Development of market, extent of market, statistics including registrations, import and export; fuels, roads, transportation and other uses, automotive laws and regulations and automotive associations.

Current Conditions—Market conditions, selling seasons and exhibitions and contests.

Manufacturing—Local industry and foreign branch factories.

Market Competition—Sales possibilities competition and prices, preferences and requirements.

Tariff and Postage—Tariff rates, customs regulations and postage.

Trade Practices—Packing, shipping and warehousing; export policies and distribution, retail sales methods, servicing, sales promotion and advertising and trade lists.

ASSOCIATION MOVES OFFICES

CHICAGO, Oct. 15.—Offices of the Automotive Manufacturers' Association have been moved from the Consumers Building to the State-Lake Building.

Parts Decline Comes Later Than Is Usual

Slowing Down by Some Makers
Fifteen to Sixty Days Behind
Other Years

MILWAUKEE, Oct. 15.—Although the condition is not general, there is to be noted a slowing down in orders as well as shipping directions on old orders in the automotive parts and units industries. This is regarded as a normal development, which has set in from fifteen to sixty days later than was customary in past years.

In a number of instances demands from factories are as active as ever and no intimation has been received of a slackening, although this is expected to result momentarily, if past experience may be accepted as a guide.

Signs Point to New Models

It would appear that further announcements of new models by established factories are due between now and Jan. 1. Local foundries furnishing castings to well known makers are reported to have received blue prints which mean nothing less than preparations for volume production of designs of radical change by comparison with stock parts heretofore made. The plans are jealously guarded and information of a definite nature consequently is lacking.

Makers of manufacturer's stock equipment are as busy as ever on immediate orders and contracts for future delivery. Many factories apparently are covering their requirements for winter and spring production. Orders on books are on the whole considerably in excess of the volume carried a year ago.

At the middle of October it is to be noted that retail sales in the Milwaukee district are hesitating and the tendency is to slow down. Most dealers have been able, by exerting selling pressure, to keep up September volume in the first half of this month. Some of the best known and most popular makes are still behind on orders and prospects are pressing for quick deliveries, although there is no record of cancellations on account of non-delivery.

Buyers Waiting Until Spring

Potential customers as a rule are satisfied with new models and prices, but there are many who desire to defer buying until spring, not caring to push a new car through the severe winters in this zone. There also is discernible a mental attitude detrimental to quick selling. People at this time are vaguely wondering what the signs of the times mean. The general situation, to them, seems to be laboring under certain strains and cross-currents. The public mind is not at ease, despite the excellent level to which business in general is holding.

The used car situation, on the surface, is not occasioning any spirited comment.

Chicago Wants Cars to Have More Color

Closed Car Show Disappointing at Comparatively Few Bright- Hued Jobs

CHICAGO, Oct. 13—Chicago dealers were well pleased tonight when the doors closed on the opening day of the first annual closed car show. The attendance was not heavy, but there was a good number of visitors from the time the doors were opened.

Forty-three dealers are exhibiting cars and these comfortably fill the main floor of the Coliseum and Annex. Some disappointment is expressed by exhibitors that there are not more brightly painted cars on exhibition. A Franklin, with a canary yellow body and fabric top, is one of the bright spots on the floor. There are other specially painted cars, but they are not too bright to hurt their saleability.

Dodge Brothers is exhibiting two cars painted in colors sufficiently bright to attract attention to an exhibit that is so habitually sombre. Of the four cars in the Hudson-Essex exhibit, three are specially painted.

Two Stars in maroon attract considerable attention, but in the main the show is not as bright as a good many exhibits on dealers' floors, as Chicago dealers have been running pretty heavily to specially painted jobs.

Models Previously Described

While many of the models displayed are new to the Chicago public, there are none that have not been described in AUTOMOTIVE INDUSTRIES, either as they were announced or in the description of the cars on display at the New York closed car show.

Among the cars exhibited are the following:

Apperson, Auburn, Buick, Cadillac, Case, Chandler, Chevrolet, Chalmers, Cleveland, Cole, Columbia, Cunningham, Davis, Dodge, Dort, Durant, Duesenberg, Elcar, Essex, Franklin Ford, Gardner, Gray, Haynes, Hupmobile, Hudson, H. C. S., Jewett, Jordan, Kissel, Lafayette, Lincoln, Marmon, Maxwell, Moon, Nash, Oakland, Oldsmobile, Overland, Packard, Paige, Peerless, Pierce-Arrow, Reo, Rolls-Royce, Rickenbacker, R & V Knight, Star, Stanley, Stearns, Stephens, Studebaker, Velle, Westcott, Wills, St. Claire, Willys-Knight and Winton.

Show Indicates Quiet Season

DETROIT, Oct. 15—Attendance and sales at the closed car show of the Detroit Automobile Dealers Association last week exceeded those of previous closed car shows held here. Neither attendance nor sales, however, showed any tendency on the part of the city's population to grow excited about automobiles at this season, and makes it practically certain that there will be no large buying movement in the fall and winter.

The attention of show-goers in the main was centered upon the recent new models, only mild interest being shown

in the cars which have been current for some time. Certain standard makes were favored in the buying, and in practically every instance dealers promised immediate deliveries. This in itself indicates the general slowing up in the buying in this district, as deliveries for most of the year have been on a thirty to sixty-day basis.

New York Made 73,160 Sales to September 30

NEW YORK, Oct. 16—Statistics compiled by Sherlock & Arnold, publishers of the Automobile Sales Analysis, show an increase in sales of higher priced cars in the metropolitan district during September and a drop in the medium and low priced.

In the former class two cars maintain the lead with sales for the nine months in excess of 1000, while five others show sales greater than 200. Four cars in the low and medium priced class show sales of more than 5000 for the three quarters, with two others in excess of 2500 and nine others greater than 1000.

Total sales of higher priced cars for the nine months of this year are 6010 as against 5581 in 1922 and 3564 in 1921.

Aggregate sales for the same period this year in low and medium priced models are 67,150 as compared with 54,023 in 1922 and 35,802 in 1921.

Recapitulation of sales for the nine months of this year is as follows:

Month	Medium and Low Priced	Higher Priced
January	2,814	201
February	2,801	580
March	3,102	769
April	1,124	1,106
May	11,287	992
June	9,782	732
July	9,234	653
August	6,531	469
September	5,475	508
Total	67,150	6,010

September Retail Sales Made Mark in Louisville

LOUISVILLE, KY., Oct. 15—Sales of motor cars in this market held up remarkably well in September, according to figures compiled by the Louisville Automobile Dealers Association. Total registration during the month amounted to 821 new cars which compares with 928 in the preceding month and 929 during July. This far excels any previous September record.

These figures do not include wholesale business, which is a considerable item, on the books of Louisville distributors, many of whom cover territory ranging from a few counties to practically all of Kentucky and Southern Indiana.

Profitable business for the remainder of 1923 is anticipated by those who base their calculations on the continuation of sales volume shown thus far in the season.

Sales this year have exceeded the total for 1922, bringing the registration of passenger cars in Jefferson County today to practically 30,000.

Price Uncertainty Delays Iowa Sales

Dealers in Light Cars Have Good Year—Trucks Behind Expectations

DES MOINES, IOWA, Oct. 16—Car sales in Des Moines and Polk County are continuing to better the sales records set last year, according to a survey made by S. P. Whiting, secretary of the Motor Trades Bureau of the Chamber of Commerce. During September of this year 457 passenger cars and forty-five trucks were sold as compared with 358 cars and twenty-eight trucks sold last year during the same month.

Although sales have shown a usual drop over those of last month, the demand seems to be fairly brisk for this time of the year. Announcement of new models and recent price cuts have affected the market to some extent.

The average buyer is at a loss to know whether automobile prices are on a downward trend or are going up. This situation, caused by some manufacturers announcing cuts while others are increasing prices, has tended to postpone buying to some extent. Sales so far in this vicinity have averaged more than a 25 per cent increase over last year.

Sales Increase Over 1922

While reports from other sections of the State are not quite so favorable, sales have shown a substantial increase over 1922. Dealers in light cars have enjoyed a very good business this year; in many cases they have not been able to get enough cars to fill their orders. The truck business of the outlying sections of the state has not shown the substantial increase that has been enjoyed in the larger cities.

With the fall tractor season about closed, distributors claim that the tractor business has not lived up to expectations. Heavy rains during the fall months have put the ground in such condition that few farmers have felt the need of tractors for fall plowing.

Some tractors are being sold for belt work, but the peak of the tractor business has passed for this year. A healthier note is evident in the farm equipment business than last year. Although the farmer seems to have as little ready cash as last year, credit is easier and buying has been more extensive. Most farm equipment dealers and distributors have enjoyed a much better business than last year.

PHILADELPHIA TRADE GOOD

PHILADELPHIA, Oct. 15—Manufacturers and dealers in passenger cars and trucks in the Philadelphia territory report that business is in a satisfactory condition. While in the case of trucks the volume is not up to the high point reached in the early part of the year, it is running ahead of the average.

U. S. and Firestone Drop Consumer Lists

Fisk Is Considering Question—
Other Tire Companies
Are Non-Committal

NEW YORK, Oct. 18—Two leading tire manufacturers have eliminated the consumer's price list, and there are indications that several others are considering similar action. The first to take this radical step was the Firestone Tire & Rubber Co., and its action was followed almost immediately by the United States Tire Co.

Rumors that the Fisk Rubber Co. had made a similar decision are denied, although it is said that the company's executives are seriously considering the question. The Kelly-Springfield Tire Co. has discussed the situation, but as yet has not made any decision. Both Goodyear and Goodrich also are non-committal.

Elimination of the consumer's list is in line with the recommendations of a good many dealers who have contended that a tire merchant should be permitted to mark up his merchandise to yield a margin over operating expenses which he considers necessary, as do dealers in a great many commodities.

Particularly in recent months have dealers, notably those in the National Tire Dealers Association protested against manufacturers' advertisements of reduced price lists. There was a storm of protest when several manufacturers cut their prices and advertised their reductions last summer while dealers had sizable stocks purchased at dealers' discounts from the old lists.

For some time a number of manufacturers have not had consumer lists, but the majority have adhered to the opposite practice.

Firestone also announced that it had cut dealers' prices 15 per cent on 4, 4½ and 5 inch sizes, bringing the prices to the same basis set for Ford sizes by its former reduction. Fisk also made a 15 per cent reduction, while United States readjusted its list, reducing certain grades 3½ to 12 per cent and advancing other grades 7½ to 10 per cent, the cuts coming on the larger sizes. On the other hand the Sterling Tire Corp. advanced prices from 5 to 7 per cent.

Carburetor Patent Suit Is Passed On in Chicago

CHICAGO, Oct. 17—A memorandum decision has been handed down in the United States District Court here in the case of the Stromberg Motor Device Co. vs. the Beneke & Kropf Manufacturing Co., involving alleged infringement of carburetor patents owned by the respective companies. The Stromberg company manufactures Stromberg carburetors, and the Beneke & Kropf company Rayfield carburetors.

The Stromberg company originally alleged infringement of four of its patents by the defendant's company. The allegations were withdrawn as to two of the claims, and the case was tried on the other two, known as the Anderson and Goldberg patents.

The Beneke & Kropf company, in an answering suit, alleged the plaintiff had infringed its patent, known as the Rayfield patent. This case was considered and tried with the original suit.

The court found for the defendant as to the Anderson and Goldberg patents and for the plaintiff as to the Rayfield patent, that is, that Beneke & Kropf had not infringed the Stromberg patents and that Stromberg had not infringed the Rayfield patent.

Following the decision, C. W. Stiger, president of Stromberg, stated that so far as his company was concerned none of the points at issue had been determined, and that, although notice of appeal had not yet been filed, the case undoubtedly would be carried to a higher court. The Beneke & Kropf company considered the District Court decision a distinctive victory for it.

FINANCIAL NOTES

General Tire & Rubber Co. has declared its regular quarterly dividend of 1½ per cent and also announced that no employee has been laid off for nearly three years.

American Bosch Magneto Co., Springfield, Mass., reports net earnings for eight months of approximately \$265,000, or about \$3 a share on the 96,000 shares of stock as compared with \$38,000 for the same period last year.

Hendee Manufacturing Co. reporting for its fiscal year ended Aug. 31 shows in 1923 a net income of \$207,737 as against a net loss of \$1,273,238 the year before. After payment of dividends on the \$1,000,000 of 7 per cent cumulative preferred stock there was earned \$1.38 a share on the 100,000 shares of outstanding common stock of \$100 par.

Durant Motor Co. of Michigan for the year ended June 30 shows a surplus of \$2,217,104 as against \$644,420 for the preceding year. Total assets were \$8,835,034, against \$3,586,046. A part of this increase was due to credits owing the corporation, being \$2,856,143 this year, against \$554,986 a year ago. The real estate this year was valued at \$2,164,844 contrasted with \$1,519,637 in 1922, and the merchandise, material and other tangible property was valued at \$3,384,023 compared with \$654,938. The company also reports \$2,242,720 in common stock outstanding and \$1,064,440 as subscribed and partially paid for.

American Chain Co., Inc., reports for the first half of the year net earnings, before tax reserves, of \$1,718,403. Earnings from operations totaled \$2,392,218; amortization, depreciation, etc., \$486,450; interest, \$187,365 and dividends on the Class A stock, \$337,707. Net earnings for July, August and September, before reserves for Federal taxes, exceeded \$1,000,000, while gross sales for the eight months ended with August were \$20,945,648, which exceeds the total gross business for the year 1922. Net earnings for the eight months were more than two and one-half times those of 1922. The balance sheet as of July 31 shows quick assets of \$14,343,500 against quick liabilities of \$2,385,000.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

General business continues to show considerable irregularity. On the whole, goods are moving in larger volume, although there is still a disposition to defer the filling of all but immediate requirements.

The price of wheat was steady throughout last week, while corn gained from 2 to 3 cents a bushel. Cotton also registered a notable gain to 30.45 cents a pound on Monday, as compared with 28.20 a week before.

Unfilled orders of the United States Steel Corp. on Sept. 30 amounted to 5,035,750 tons. Although this figure marks a decline of 378,913 from the unfilled tonnage at the end of August, it indicates an increased volume of new orders during September aggregating from 50,000 to 100,000 tons.

The value of building construction in September declined 11.4 per cent from the August figure, according to Bradstreet's report for 152 identical cities.

Discounts by the Federal Reserve banks declined \$12,600,000 during the week ended Oct. 10, bills secured by Government obligations increasing \$6,100,000 and "other bills discounted" decreasing \$18,700,000. The volume of bills purchased increased \$9,500,000, while holdings of United States securities fell off \$3,300,000. Total deposits declined \$30,500,000, of this amount \$20,200,000 being in members' reserves and \$9,900,000 in Government deposits. The circulation of Federal Reserve notes increased \$16,300,000 and total reserves \$5,900,000, while the reserve ratio rose from 75.8 to 76.1 per cent.

Loans of reporting member banks increased \$107,000,000 during the week ended Oct. 3, \$61,000,000 of the increase being in loans secured by stocks and bonds and \$46,000,000 in "all other" loans. Total investments declined \$23,000,000.

Both call and time loan rates were virtually unchanged last week, call money moving in small volume at 4½ to 5½ per cent and time money at 5½ to 5½.

Collins Denies Charges Brought by Stockholder

CLEVELAND, Oct. 17—Richard H. Collins, president of the Peerless Motor Car Co., has filed in the Court of Common Pleas here a general denial to claims of irregularity in his contract with the Peerless company. The charges were made in a stockholders' suit brought by David Rockwell in which a demand was made that Collins pay back certain moneys received.

Collins, in his answer, stated that the contract had been approved by the directors and stockholders. He replied that although he was allowed a bonus of \$65 on every Peerless car manufactured under the old contract, he collected only about one third of the amount in 1922.

Steel Demand Falls from Previous Level

Little Difficulty Being Experienced in Getting Reasonable Deliveries

PITTSBURGH, Oct. 16—Independent sheet mills booked double the new business in September that they did in August and new orders so far this month are running about equal to those of a similar period in September. The average production of the independent mills in September was 75 per cent. New business coming to the sheet mills is classified as general and includes, in addition to car orders, a quantity for electrical equipment and outdoor construction.

The demand from automobile interests is not as heavy as formerly and these consumers are finding little or no difficulty in getting reasonable deliveries. Mills as a practice are taking Japanese business only where domestic trade is light.

Some 10,000 tons of the 60,000 tons of galvanizing sheets sought through Secretary of Commerce Hoover by the Japanese have been placed with the mills but this material will be manufactured intermittently between domestic orders to keep finishing mill labor in an amicable frame of mind. The light gage and odd sizes demanded by the Japanese do not find favor among the rolling mill workers.

Automobile manufacturers in other grades of steel are finding no difficulty in securing prompt shipments. Base prices, however, are not being shaded to any extent in this territory. Among the steel men themselves there is a better feeling regarding the trade. Some are predicting a stiffening in prices within a month.

Attorneys General Meet on Gasoline Situation

CHICAGO, Oct. 16—Representatives of the legal departments of three-fourths of the states of the union met here this week for a conference on gasoline prices and proposed methods of regulating the marketing of this automobile fuel. The conference was called by the attorney general of Nebraska and the attorneys general of many other states were present. Sessions of the conference were held behind closed doors.

Among those persons attending was Gilbert E. Roe, counsel for the Senate committee which last winter investigated the gasoline situation.

R. L. Welsh, secretary of the American Petroleum Institute, came from New York prepared to submit data to the conference, but up to today he had not been invited to appear before it.

New York Wants Investigation

NEW YORK, Oct. 18—Simultaneously with the announcement by the Standard Oil Co. of New Jersey and the Standard Oil Co. of New York of price reductions

to meet the cuts made by the Gulf Oil Co., Acting Mayor Murray Hulbert of New York City made a formal demand for an investigation by Congress and the New York State Attorney General into the price of gasoline in this State.

Hulbert argued that the low prices elsewhere in the United States and the large surplus of gasoline in California made it possible to ship to New York gasoline that could be sold at lower prices.

Standard's cut is 3 cents a gallon in Massachusetts and 2 cents in New York, while in New Jersey there has been a 2-cent drop.

INDUSTRIAL NOTES

Columbus Varnish Co. of Columbus, Ohio, manufacturer of varnishes and automobile specialties, is making large additions to its plant. One of the new buildings is to be 62 x 130, doubling the size of the reducing room. This expansion it is said, will give the company one of the largest strictly varnish factories in the United States.

Reiter-King-Dugan Co., Akron, Ohio, maker of dash gasoline gages, has opened offices in Cleveland and Detroit. A. L. Holmes is in charge of the Cleveland office at 305 Plymouth Building, and G. B. Holmes of the Detroit office at 410 Burns-Gray Building.

E. G. Manufacturing Co., Inc., of which Emil G. Grossman is president, has moved its offices from 1721 Broadway to 1409 Flisk Building, New York City. The company represents twelve manufacturers of accessories.

Duesenberg Automobile and Motor Co., of Indianapolis, has leased an additional building to house its test department in order to clear the final assembly plant for increased production of closed cars.

Reliance Manufacturing Co., maker of pistons and piston rings, has occupied its new building in Cedar Rapids, Iowa, which will enable it to handle a greater volume of business in quicker time.

International Cotton Mills Co. will erect a \$2,000,000 factory at Hogansville, Ga., devoted primarily to the manufacture of automobile tire fabric. Work on the plant is to begin within a comparatively short time and operations will start some time during the next six months, on completion of the initial units.

Fyrac Manufacturing Co. of Rockford, Ill., and the Clymer Manufacturing Co. of Denver have cross-licensed each other for the manufacture of through-the-windshield spot lights. Both companies have patents and have patents pending on through-the-windshield spot lights and a special tool for cutting a hole in the windshield without removing the glass. These patents include the basic Vallot patent.

FORD MAKES MILES OF WIRE

DETROIT, Oct. 16—Ford Motor Co. is now producing 70½ miles of 17-gage insulated copper wire for the armatures of starter generators at the Highland Park plant. The company undertook the manufacture of wire in January of this year, after failure to get wire of standards sought. Machinery for the wire plant ordered in January began operating in May. With its output the company is able to make 6500 generator units daily.

METAL MARKETS

Fresh developments in the steel market are conspicuous by their absence. Although strictly committed to a from hand-to-mouth purchasing policy, automotive consumers continue to be the chief support of the steel industry. If there has been any change in buying methods at all in the last few weeks, it has been in the direction of making more bites out of a cherry than heretofore. Sheet buyers have been receiving shipments so promptly that they have seen no reason so far for anticipating their wants more than a few weeks. From now on seasonable delays in transportation must be taken into consideration, and it will not do to play too close to the cushion.

Sheet mills continue to operate at a rate of between 80 and 85 per cent of capacity, and some of the mills catering especially to the demand for full-finished automobile sheets make even a slightly better showing. On the whole, however, the demand for steel is far from satisfying to the producers. The more optimistic among the latter, as is unusual amid such conditions, predict the early placing of heavy orders by the railroads. Buying by the latter can always be so adjusted as to furnish a stop-gap in the steel industry's hour of need.

In this connection it is of interest to note the observations of a steel market statistician who shows that compared with the pre-war period (when an annual production of 30,000,000 tons of steel ingots was normal) last month's output was 37 per cent above the satisfactory average of those days, whereas compared with last April (when steel was produced at the rate of 49,000,000 tons a year) the output had fallen off 16 per cent.

The perturbing feature from the steel producer's viewpoint is not so much the decline in the demand from the record period, but the trend which has been showing a steady tapering off in buying. Considering this, it is remarkable how little price cutting is in evidence. Some black and galvanized sheets continue to be sold at concessions, but much more representative tonnages pass into consumption at full prices. Cold-finished steel bars as well as strip steel price levels are also fairly well maintained. Individual orders, of course, are very light, and it is only natural that mills refrain from cutting prices on what in a more active market would be looked upon as accommodation tonnages.

Pig Iron.—There appears to be just enough demand to maintain prices on the \$24 and \$24.50, Valley, basis for No. 2 foundry. It is significant that a purchase of 2000 tons the other day was made much of, whereas in former times any quantity below 5000 tons was deemed too insignificant to have any bearing on the market. Automotive foundries have not changed their practice of buying in single car lots for the time being.

Aluminum.—Negotiations for contracts with the sole domestic consumer are proceeding slowly, and the spot demand for metal is of negligible proportions, nor has there been any increase in offerings in the "outside" market.

Copper.—Copper and brass products manufacturers in the Detroit territory report continuingly good demand from the automotive industries, a condition not quite so much in evidence in the Waterbury district where all lines, except wire, are reported dull. The market for ingots is still in the doldrums and remedial measures aiming at curtailment of production are being discussed by producers.

Calendar

SHOWS

- Oct. 17-27—New York Electrical and Industrial Exposition, showing electric trucks, cars, parts and accessories, Grand Central Palace.
- Nov. 4-10—New York, First Automobile Exposition of the Foreign Automotive Association, Hotel Astor.
- Nov. 11-17—New York, Annual Automobile Salon, Hotel Commodore.
- Nov. 12-17—Chicago, Annual Business Exhibit and Convention of the Automotive Equipment Association, Coliseum.
- Jan. 5-12—New York, Annual Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Eighth Coast Artillery Armory.
- Jan. 26-Feb. 2—Chicago, Annual Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.
- Jan. 26-Feb. 2—Chicago, Annual Automobile Salon, Hotel Drake.

Chicago Feb. 4-9
Tenth Annual National Motorcycle, Bicycle and Accessory Show, Broadway Armory, under the auspices of the Motorcycle and Allied Trades Association, A. B. Coffman, secretary.

FOREIGN SHOWS

- Oct. 24-Nov. 2—Paris, Trucks, Agricultural Tractors, etc., Grand Palais.
- Nov. 9-18—Buenos Aires, Annual Automobile Exposition, under the direction of the Automovil Club Argentino.
- Nov. 2-10—London, Automobile Show, Olympia.
- Nov. 22-Dec. 1—London, Motor Transport Exhibition.
- Dec. 8-19—Brussels, Passenger Cars, Trucks, Airplanes and Motor Boats, Aviation Palace.

RACES

- Oct. 28—Barcelona, Spain, Grand Prix for vehicles of 1500 c.c.; Nov. 1, International Grand Prix for cycle cars of 1100—Nov. 4, Interna-

tional Grand Prix for two liter.

CONVENTIONS

- Oct. 24-26—Cleveland, Thirtieth Annual Convention of the National Association of Farm Equipment Manufacturers, Hotel Statler.
- Oct. 25-27—Lake Mohonk, N. Y., Mountain House, Semi-Annual Meeting of the American Gear Manufacturers Association.
- Nov. 21—Annual Meeting, Motor Truck Industries, Inc., Place of Meeting Not Decided.
- Jan. 24-31—Chicago, Annual Convention and Show of the American Road Builders' Association, the former to be held in the Congress and the latter in the Coliseum.
- May, 1924—Detroit, International Motor Transport Congress under the auspices of the National Automobile Chamber of Commerce.
- S. A. E. MEETINGS
- Oct. 25-27—Production Meeting of the S. A. E.—Cleveland.

- Oct. 29—Buffalo Section, Problems in the Construction of Low-Pressure Tires, J. F. Palmer, Statler Hotel, Buffalo, 8 p.m.
- Oct. —Cleveland Section—No Meeting in October Because of National Production Meeting in Cleveland Oct. 25-27.
- Nov. 15—Metropolitan Section, Commercial Air Travel, C. W. Warner.
- Dec. 13—Metropolitan Section, Vehicles for Package Delivery.
- Jan. 22-25, 1924—Annual Meeting of the S. A. E.—Detroit.
- Feb. 14, 1924—Metropolitan Section, Vehicle Depreciation.
- March 13, 1924—Metropolitan Section, Replacement Parts and Accessories.
- April 17, 1924—Metropolitan Section, Fleet Maintenance, F. W. Winchester.
- May 15, 1924—Metropolitan Section, What Roads and Steels Do to Automobiles.

European Race Rules Now Being Prepared

PARIS, Oct. 6 (by mail)—Supercharger devices and two-stroke engines are expected to be forbidden under the rules of the next European Grand Prix, to be held in France during the summer of 1924. This event being international, the rules have to be decided on by all the countries of Europe, with the United States represented by a delegate of the Automobile Club of America.

Expressions of opinion have been solicited from the various parties, with the result that all but Italy have pronounced against supercharged devices.

The French Club has authority to draw up the rules after obtaining the consent of other nations on the main points and, in all probability, it will decide in favor of the retention of the 122 cu. in. piston displacement rule, with a clause that the mixture shall be taken in at atmospheric pressure and that no two-stroke engines be used.

This decision will put the competitors on an equality, but will arrest progress. Work on supercharger engines has been confined to Germany and to one firm in Italy. In France, England and America practically nothing has been done in this direction.

Although French firms are now beginning to pay attention to the supercharger, it would have been a difficult matter for them to make up leeway before next July and as the supercharger has unquestionably proved its superiority, a foreign victory could be counted on as almost certain. German engineers claim that they are getting 150 hp. out of 122-in. two-stroke engines fitted with a supercharger device. This year the power obtained from French 122 in. four-stroke engines varied between 75 and

105. Although Germany was allowed to run in the first European Grand Prix at Monza, it is not known whether she will be admitted in the second event to be held in France.

13-Year Old Girl Wins Prize for Safety Essay

WASHINGTON, Oct. 15.—Theodora Poole, a thirteen year old school girl of Pontiac, Mich., now residing in Lansing, has been declared the winner of the second national safety essay contest conducted under the auspices of the Highway Education Board for prizes given by the National Automobile Chamber of Commerce.

Edwina Hull, a school girl living in Frontier, Wyo., won second national honors, while third prize went to Lester E. Rolland, of Thief River Falls, Minn.

The Highway Education Board also announced its third annual contest in which \$6,500 will be divided into 485 prizes to be given for best essays by pupils and lessons by teachers.

British Planning Tractor Demonstration Next Year

LONDON, Oct. 7 (by mail)—The Society of Motor Manufacturers & Traders (agricultural machinery section) has made provisional arrangements for organizing a series of power-farming trials near London in September, 1924.

The main intention is to afford an opportunity for those overseas visitors who will be in England in connection with next year's British Empire Exhibition to see tractors and other power-farming implements in operation. Entries, however, will not be confined to British equipment, for foreign tractors will be allowed to participate.

All State Title Laws Urged to Halt Thefts

WASHINGTON, Oct. 16.—Officials of the American Automobile Association, seeking a way to reduce the constantly growing number of automobile thefts, have been advised by William J. Burns, Chief of the Bureau of Investigation of the United States Department of Justice, that these thefts can be checked effectively by the passage of title registration laws by the various States.

This, he thinks, has been demonstrated by the successful experience of the States which have enacted adequate title registration and title certificate laws.

Results obtained by the Bureau, under the direction of Burns, indicate the value of the Dyer or national automobile theft act, which makes interstate or international traffic in stolen cars a Federal offense. The annual report of the Department of Justice on the work done by Burns' bureau is expected to show that during four years many millions of dollars worth of stolen automobiles have been returned to their owners with thousands of convictions, accompanied by prison sentences.

In such States as Maryland and Michigan, where thorough title registration laws are in effect, Burns points out that it is almost impossible to sell a car stolen within the borders of those States as the thief or "fence" is unable to furnish a clear certificate of title to the car.

"This does not prevent cars from being stolen in these States, however, as they are run into other States for that purpose," says Burns. "But if all States had similar laws, nine tenths of the inducement to theft would be removed and I see no reason why nine tenths of the thefts would not cease."